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THE appointments to the Interstate Commerce Commission made by President Wilson immediately after his inauguration give general satisfaction to railways and shippers. Commissioner E. E. Clark's reappointment was desired by most of those who were familiar with his work on the commission and who wished to see it maintained as a fair and efficient body. Many persons would like to see one or more experienced railway officers appointed to the commission. Aside from this there is little or no criticism and much commendation of the promotion of Secretary Marble to the membership made vacant by the retirement of Franklin K. Lane to become secretary of the interior. Mr. Marble has served the commission capably as an attorney and as its secretary. As one of its attorneys he conducted some important investigations into transportation conditions and practices. He is able, very industrious, and always has been considered fair. An active member of a state commission notorious for its baiting of railways was pressed for appointment to succeed Mr. Lane. Those directly affected by the commission's work, as well as the general public, may well give thanks, not only for Mr. Marble's appointment, but for the failure of the state commissioner in question to get appointed. The retirement of Mr. Lane as chairman and a member of the commission has taken from it one of its ablest members. If he had always been as fair as he was able, Mr. Lane would have taken rank among the greatest public utility commissioners that the country has ever had. Unfortunately for his work on the commission, his temperament is decidedly more administrative than judicial. This gave him a tendency to wish to manage the railways rather than simply to regulate them. As a cabinet officer he will be in a position better suited to his temperament and to the exercise of his unquestionably great talents.

A JOINT resolution was introduced in the Wisconsin senate the other day, and referred to the committee on corporations, which reads as follows: "Resolved by the senate, the assembly concurring, that whereas railroad travel is a most beneficent means of education, and broadening to the people of this state, and whereas the visiting of all parts of the state by its people is highly conductive to the welfare of the people of the state, and the development of its resources and business, therefore be it resolved, That the Railroad Commission of Wisconsin is hereby directed to investigate and report to the next session of the legislature to meet in 1915, the effect of an increase of freight rates and decrease of passenger rates to one cent per mile, and how much increase of freight rates would be required to make up for the reduction of passenger rates to one cent per mile, and its conclusions upon such reduction of passenger rates to one cent per mile of travel." In view of the beneficent and broadening effects which the Wisconsin senator attributes to railway travel, one might wonder perhaps that he did not instead present an amendment to the anti-pass law to permit everybody to ride free. However, we are considering in this instance an unusual type of state senator. He wishes to be fair to the railways without ceasing from his lifelong endeavor to be a friend of the people. Perhaps, too, he does not believe in pauperizing his constituents, and feels that the advantages of travel will be more highly appreciated if they are asked to contribute a small part of its cost just to show good faith. Shippers and consignees, while also developing the resources of the state, are engaged in the business of making profits out of the process of moving commodities from one place to another where their price will be higher. The passenger who is being beneficently educated and broadened may not be making money out of it. Therefore, instead of making the railways pay for his education and broadening, and perhaps lopping off some of their freight rates for good measure, the senator would impose the burden on those who are deriving the greatest benefits from transportation.

WE fear that our friend, the senator, will not be appreciated in his day and generation. It is true that the passengers have more votes, and that on government owned railways it is quite common for passenger fares to be low and freight rates high, but in Wisconsin and other parts of our great democracy the shippers are better organized. As for the Wisconsin commission's conclusions upon such reduction of passenger fares, they are readily available, if the commission has not changed its mind, in its decision rendered in 1907, reducing passenger fares in the state to 2½ cents per mile. The commission said at that time, "We are not concerned about what our right might be to reduce the passenger rates to a point where passengers were being carried at a loss and to recoup such loss by a species of piracy practiced upon the shippers of the state. . . . We believe not one good economic reason can be urged in favor of making the shipper bear a portion of the carrying cost of the passenger. Low freight rates are vastly more important to the people of the state than low passenger fares. . . . The freight rate is in reality an indirect tax. . . . actually paid by the consumer. . . . If it is excessive it may be more important that it be reduced to a proper level than that the consumer should have the privilege of riding at two cents a mile. He must use coal. He may not want to ride even at two cents." The senator apparently appreciates that *reductions* in freight rates do not always reach the consumer so directly as indicated by the theory which the commission elucidates. Therefore, he believes that the people will be more benefited by a reduction in passenger rates. He fails to recognize, however, that *advances* in freight rates nearly always do reach the consumer. Enough reasons have perhaps been indicated to keep the railways from becoming unduly elated by any hope of the advance in freight rates held forth by the resolution or from being unduly worried over the prospect of the proposed reduction in passenger fares.

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MEDILL McCORMICK, who is one of the principal owners of a large Chicago newspaper, and also a leader of the progressives in the Illinois legislature, has introduced a full crew bill, after the defeat of a similar bill at the last session. The *Manufacturers' News*, the organ of the Illinois Manufacturers' Association, is moved thereby to comment as follows: "We are at a loss to understand why Mr. McCormick appears as the father of this measure. Last spring the newspapers of Chicago went to the mat with the labor unions because the pressmen's union was working a superfluous man or two on the press crew in some shops and wanted to in others. We cannot understand why it is not just as fair for the newspapers to pay for a man they do not need in the operating of a press as it is for the railroads to pay for a man they do not need in operating a train. We should think that if Mr. McCormick pursues the policy he is now following some one would get up in the legislature on behalf of the pressmen's union, and introduce a bill regulating the number of men necessary to operate a newspaper press." Special regulation of railways is only justified on the ground that they are public service corporations and that regulation is needed to cause them to render service in such a way and at such rates as will promote the interests of the public. Legislation to confer an advantage on the employees at the cost of the roads, which is not primarily intended and does not operate to confer an advantage on the general public, is no more justifiable than similar legislation regulating the relations between manufacturers and their employees, farmers and their employees, grocers and their employees, or newspapers and their employees. Consistency and principle demand that those who advocate such legislation as to some business concerns shall advocate it as to all, and that those who are not willing to have it applied to themselves shall not seek its application to others. Aside from the aptness of the parallel which the *Manufacturers' News* has drawn between the employment of superfluous labor on a printing press and on a freight train it is significant to note that as a spokesman of shippers it apparently appreciates the connection between unnecessary additions to operating expenses and the level of freight rates.

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THE Webb bill to enable states to prohibit the shipment of intoxicating liquors into prohibition territory, which was recently re-passed by Congress after President Taft had vetoed it as unconstitutional, presents some interesting complications for the railways. It makes illegal the transportation of liquor in interstate commerce when it is destined to any place where its sale is unlawful. It would be a simple matter to keep track of the "dry" states, but prohibition legislation has not followed state lines. There are prohibition counties, cities, townships, villages and other kinds of prohibition districts. There are also places where it may be legal to sell liquor at a drug store—on presentation of the proper physician's certificate, of course—while it would be illegal to transport the commodity to a grocer in the same place. Must the overworked station agent add to the list of tariffs, classifications and their supplements with which he is supposed to be familiar, a compendium of prohibition legislation and a "wet and dry" map? The law becomes effective at once; and, pending the arrival of these data, the local agent seems likely to be in as bad a predicament as Flannery in "Pigs is Pigs," who was unable to deliver a consignment of guinea-pigs because of a dispute as to their classification. Not that the commodity under consideration is liable to the same tendency toward multiplication that troubled Flannery, but booze is booze, and it has often been said on good authority that railway tariffs and classifications are enough to drive wiser men than station agents to drink. Many railways have already abolished the sale of liquor in their dining cars, partly out of respect for prohibition sentiment, and partly because of the difficulty of complying with prohibition laws on the fly. The Illinois roads stopped the sale on their trains entirely last year after a law had been passed which left a few loopholes open. It is understood that they even had something to do with bringing about the passage of the law as a means of securing better order on some of the trains largely patronized by deadhead politicians traveling between Chicago and Springfield. If they have difficulty in complying with the new law it may be no greater than they and the express companies, by allowing their agents to deliver C. O. D. packages to John Doe or a "representative" of the local minister of the gospel, have in the past caused the local authorities who were charged with enforcement of the prohibition laws.

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OXY-ACETYLENE welding and cutting has become fairly well established in the railway shops of this country, and Mr. Jacobs' observations of the extent to which it has been developed in Europe are particularly interesting at this time. Bad mistakes were made in introducing it here. One of the most serious of these was that the responsibility of its introduction was in some cases placed in the hands of salesmen who were not at all familiar with railroad work and the needs of the railway shops, or even with the apparatus itself. Too many claims were made for it, and usually the apparatus was left in unskilled hands before these claims were realized. Another feature that has not been fully appreciated has been the necessity for systematically instructing the men in the use of apparatus. As noted in Mr. Jacobs' article the German government has provided courses of study in the art of handling oxy-acetylene welding in the various trade schools, and special schools have been opened for giving instruction in this art; something should be done along these lines in this country. Mr. Jacobs was instrumental in installing several years ago in the Topeka shops of the Atchison, Topeka & Santa Fe, a stationary plant for generating the gases used in connection with oxy-acetylene welding and cutting, these gases being carried to various parts of the shop in the same way as compressed air is conveyed. As the possibilities of the process become better realized in the railroad

shops of this country, this practice will undoubtedly be extended, for it is said to have given extremely satisfactory results at the Topeka shops. The work done there was fully described by Mr. Jacobs in the June 17, 1910, issue of the *Railway Age Gazette*, page 1535. Another serious mistake has been made in the past in that the limitations of the welding process were not fully understood. For instance, attempts have been made to weld cracks in fireboxes, although those in charge should have realized that the metal in the vicinity of the crack had been weakened by the stresses to which it had been subjected and that welding the crack would only cause the fatigued metal to crack again elsewhere in the same vicinity. Oxy-acetylene, or in fact any type of welding, is useless for this purpose and should only be used where a new piece is to be inserted, replacing all of the bad material. Even then it is a most difficult job and should only be attempted by expert welders.

## A REFRESHING INNOVATION.

DIFFICULTY is often experienced by railroad passengers in learning the causes of delays to trains on which they are traveling. To remove this source of irritation, conductors should see, when traffic is interrupted, that trainmen pass immediately through their trains and freely announce the conditions, advising passengers without reservation the reason for the delay, and, if necessary, the best means of proceeding on their journey. When a train is disabled at or near a station, trainmen should notify the passengers as to the cause and probable extent of the delay in order that they may continue on their journey, or return, on any available train. If passengers desire to communicate with their friends from the station they should be accorded promptly the use of the telephone or telegraph. Station agents should post on their bulletin boards, or in other conspicuous places in their stations, a notice giving the location of any obstruction to traffic, the probable length of the delay, and any other information in their possession, as to the cause and extent of the difficulty. Passengers should have every opportunity to allay unnecessary anxiety on the part of friends or families, due to train delays or accidents. They have a right to prompt information as to the cause and the details of any delays either to the train on which they are traveling or that for which they may be waiting.

The foregoing is the substance of an order which, in mandatory form—"must" instead of "should"—has been issued to passenger conductors by the Pennsylvania Railroad. We do not put the words in quotation marks, because the thoughts are exactly like our own. If we have not put them in print with enough frequency and effectiveness, we have to that extent fallen short of the duty of a good preacher of perfect service. No superintendent or manager can be ignorant of the way in which, in innumerable instances, a passenger who is unexpectedly delayed is obliged to hurriedly revolve in his mind and compare, one with another, a half dozen different schemes for recovering as much as possible of the time that, by some slight accident, he has been compelled to lose. In very bad accidents, trainmen and station men have to some extent properly attended to passengers' interests heretofore, but the present order is significant because of its application to all circumstances. A delay of ten minutes often wastes an hour of some passenger's time; perhaps that of many passengers. The conductor or a wide-awake brakeman will often be able to save a passenger enough time in studying his routes to make the difference between catching a connection and losing it.

It is to be admitted that, if employees carry out successfully this idea of saving for passengers all the time that it is possible to save, they will be doing better than their superiors have done in the past. Theoretically, the despatchers advise agents and conductors of bad delays and, through the agents and conductors, the information reaches the passengers; but cases in which this process is intolerably slow are familiar to all experienced travelers. With the very general distribution of telephones now to be found on every railroad, there is no reason why this item of the passenger service should not be much improved, unless it be the neglect of the superintendent to order and insist on celerity. The present circular has nothing to do directly with despatchers, but the despatcher has an important connection with the matter, if the purpose of the manager is to be carried out properly.

Of course, if Pennsylvania trainmen are to tell passengers all they know they may sometimes tell things that had better be left unsaid until the superintendent can be consulted, or may lose the company a few cents by sending away a passenger who could be kept on the Pennsylvania's cars; but this bugaboo may well be ignored—if only to find out by actual test how big or little it really is. A trainman is not going to be really efficient in the promotion of passengers' comfort and convenience except as he has practice in the art, and it is high time that opportunity for practice in this branch be given. Precept has been well worked already. All of us acquire proficiency by learning the lessons of our mistakes. Trainmen, very generally, in the matter of assisting passengers in cases of delay have avoided mistakes—and have missed many good lessons—by shirking the duty entirely.

## LIGNITE AS A LOCOMOTIVE FUEL.

ABOUT two years ago the Bureau of Mines in its bulletin No. 14, on briquetting tests of lignite, stated that there were about 150,000 square miles of workable lignite beds in this country; that the principal deposits were in the western half of North Dakota, in the northwestern part of South Dakota, and in the eastern half of Montana; and that in North Dakota alone there was a workable deposit of 31,000 square miles. If we take the weight of lignite as 50 lbs. per cubic foot, the weight given in a report of the Bureau of Mines, and consider the workable lignite beds as only 1 ft. deep (some of the beds are much deeper than this), we find that there are 104,544,000,000 tons of lignite available. This supply is mainly in territory where the cost of bituminous coal is exceptionally high, and the railroads in that section are thus especially interested in making use of it as locomotive fuel.

Realizing the vast opportunities for its use in locomotive service, the International Railway Fuel Association has appointed a committee, of which S. B. Flagg, engineer of the Bureau of Mines at Pittsburgh, is chairman, to report on this subject at its annual convention to be held in Chicago next May, and it is expected that some very interesting material and data will be presented. Not only has the Bureau of Mines made several investigations of lignite at its St. Louis plant, but the railroads themselves have given it a considerable amount of attention. The American Locomotive Company has produced a spark arrester especially designed for engines burning lignite, which has been applied to 21 locomotives on the Chicago & North Western. The Chicago, Burlington & Quincy has developed an arrangement whereby lignite may be burned without the danger of large sparks being thrown from the stack and setting fires along the right of way. The Oregon-Washington Railroad & Navigation Company is using a number of Mikado engines built by the Baldwin Locomotive Works, especially designed for burning this fuel. With the cost of a good grade of coal in the western sections of Nebraska, Wyoming and Colorado ranging between $5 and $6 a ton, it would seem that marked economies could be made with lignite from the mines in North Dakota, which would cost about $1.75 a ton.

It is true that lignite has its disadvantages. In its raw state it must be used a very short time after it is mined, for if allowed to weather too long it will slake and crumble into small particles. As a means of overcoming this difficulty, the lignite briquet has been developed, which will stand weather for a considerably longer time. The cost of briquetting is found to be a trifle over the cost of the raw lignite, but the heating value will be increased about 50 per cent., and the moisture, which in the raw lignite is in the neighborhood of 40 per cent., will be reduced to about 20 per cent. Assuming that the heat value of the available

bituminous coals which come from Iowa is about 11,000 B. t. u., and that of the lignite briquet a trifle over 9,000 B. t. u. It will be seen that even with the added cost of briquetting the total cost of the fuel will be reduced. Tests of briquetted coals, not lignite, have shown that a very even fire may be maintained in locomotive fireboxes, that the boiler capacity will be increased; and that when the boiler is forced the efficiency of the briquets increases. The heat value of the lignite as taken from the mines varies between 6,000 and 8,000 B. t. u., and where coaling stations can be located near the mines the raw lignite may be used successfully; but when it must be stored more than four months exposed to the weather, or a much longer time under cover, the lignite should be briquetted.

The report on the mineral resources of the United States, by the United States Geological Survey for 1911, shows that only 8,451,365 tons of lignite were mined during that year. The lignite industry is thus decidedly in its infancy, and the possibilities of its use as a fuel for locomotives have but begun to be developed. With such a man as Mr. Flagg, who is thoroughly conversant with the coal resources of this country, as chairman of the committee for the Fuel Association, and with the backing of the railway fuel men on the committee, much can be accomplished to secure the consideration due it—although the mere fact that it is to be considered by the association, based on past records, insures a complete report and a thorough discussion.

## SUGGESTIONS FOR LEGISLATION FOR ARBITRATION OF LABOR DISPUTES.

ONE of the most important problems that the welfare of the American public demands shall be solved in the near future is that of settling without lockouts and strikes and in an equitable way contentions between railways and their employees. The deficiencies of the Erdman act are generally recognized. It does not prohibit lockouts or strikes before mediation and arbitration, and it does not make sure enough that the settlements of controversies will be such as to protect the rights and interests of all. Various suggestions for the amendment of this law are being made. The *Railway Age Gazette* offers tentatively for consideration certain provisions which a federal railway mediation and arbitration law might contain.

The term "railroad" should be defined so as to cover interurban electric roads whose tariffs are filed with the Interstate Commerce Commission or which engage in interstate commerce The provisions of the act should at least be sufficiently broad to take in all employees operating steam roads or electric roads owned or controlled by them.

There seems no good reason why the same provisions should not apply to interurban electric roads engaged in interstate commerce as to steam roads. With the progress of electrification of steam roads the differences between other characteristics of the two classes of railways, as well as between their motive powers, will tend to disappear.

It shall be unlawful for any employer to declare or cause a lockout, or for any employee to go on strike on account of any dispute prior to or during a reference of such dispute to the Mediation Commission or to a Board of Arbitration; provided, that nothing in this act shall prohibit the suspension or discontinuance of the working of any persons for any cause not constituting a lockout or strike.

Employers and employees shall give at least thirty days' notice of an intended change affecting conditions of employment with respect to wages or hours; and in every case where a dispute has been referred to the mediation commission or to a board of arbitration, until the dispute has been finally dealt with by such commission or board, neither of the parties affected shall alter the conditions of employment with respect to wages or hours, or on account of the dispute do or be concerned in doing, directly or indirectly anything in the nature of a lockout or strike, or a suspension or discontinuance of employment or work, but the relationship of employer and employee shall continue uninterrupted by the dispute, or anything arising out of the dispute; but if, in the opinion of the commission or board, either party uses this or any other provision of this act for the purpose of unjustly maintaining a given condition of affairs through delay, such party shall be guilty of an offense, and liable to the same penalties as are imposed for a violation of the next preceding section.

Any employer declaring or causing a lockout contrary to the provisions of this act shall be liable to a fine of not less than $100, nor more than $1,000 for each day or part of a day that such lockout exists.

Any employee who goes on strike contrary to the provisions of this act shall be liable to a fine of not less than $10 nor more than $50, for each day or part of a day that such employee is on strike.

Any person who incites, encourages or aids in any manner any employer to declare or continue a lockout, or any employee to go or continue on strike contrary to the provisions of this act, shall be guilty of an offense and liable to a fine of not less than $50 nor more than $1,000.

The board of arbitration that handled the controversy between the eastern railways and their enginemen recommended that some limitation should be put on the legal right of railway employees to quit work as well as on the legal right of railway managements to interfere with transportation service by lockouts. Strong objection has been made to any such legislation by some spokesmen of labor. They contend this would be an infringement on the liberty of working men. It would not, of course, be any more of an infringement on the liberty of railway employees than on that of railway managements. It is not proposed to prohibit any individual employee from quitting work or being discharged for ordinary causes. It is not even proposed to prohibit a disruption of the relations between the employers and the employees after mediation and arbitration. It is only proposed to prohibit a strike or lockout and the resulting interference with transportation service prior to and during the pendency of mediation and arbitration. The public's right to insist that transportation service shall not be stopped, or practically stopped, before employers and employees have presented their claims and the evidence in support of them to some impartial body representing the public, and until this body has reported on the merits of the controversy, seems clear. The only sound foundation of any legal right of any person or class of persons is that the existence of that legal right tends to promote the greatest good of the greatest number. If a legal right cannot be exercised except in opposition to the greatest good of the greatest number it is one that should be curtailed or abolished. Surely, neither a lockout nor a strike that interferes with transportation, nor the existence of the right to precipitate such a lockout or a strike before every reasonable means for preventing it has been exhausted, can be held to be in the interest of the greatest good of the greatest number.

A permanent commission of three members on mediation, conciliation and investigation shall be constituted, composed of the chairman of the Interstate Commerce Commission, another member of the Interstate Commerce Commission to be named by the chairman, and the United States Commissioner of Labor.

In the event of difference one member shall be added and shall be named by the railway employer and one shall be added to be named by the railway employees—parties to the difference.

Whenever a difference exists between any railway employer and railway employees and it appears to the Interstate Commerce Commission that the parties thereto are unable to satisfactorily adjust the same, and that by reason of such difference remaining unadjusted a railway lockout or strike has been or is likely to be caused, or the regular and safe transportation of mails, passengers, and freight has been or may be interrupted, or the safety of any person employed on a railway train or car has been or is likely to be endangered, the Interstate Commerce Commission may either on the application of any party to the difference or on the application of any municipality directly affected by the difference, or of its own motion, cause inquiry to be made into the same and the cause thereof, by the mediation commission.

The chairman of the Interstate Commerce Commission shall, in writing, notify each party to name a member of the mediation commission, stating in such notice a time, not later than five days after the receipt of such notice, within which this is to be done.

If either party within such time, or any extension thereof granted by the Interstate Commerce Commission, does not appoint a member of the mediation commission, the three members of the permanent commission may appoint any members in the place of those in default.

It shall be the duty of the mediation commission to endeavor by conciliation and mediation to bring about an amicable settlement of the difference to the satisfaction of both parties and to report its proceedings to the Interstate Commerce Commission.

In case the mediation commission is unable to effect an amicable settlement by conciliation and mediation the Interstate Commerce Commission may refer the difference to arbitration. In such case a board of arbitrators shall be established by the Interstate Commerce Commission, and shall consist of the permanent members, two other members selected by these three members, and one member to be selected by the railway employer and one by the railway employees. In case either party within ten days after the receipt of notice fails to name its member of the arbitration board, the five members of the board shall themselves select a member or members in the place of the party or parties in default, and the board of

seven so constituted shall act as a board of arbitrators. In case of arbitration pursuant to the above provisions, the findings and recommendations of the majority of the arbitrators shall be those of the board.

The proper composition of an arbitration board has been the subject of much discussion and many differences of opinion. F. A. Delano, it will be recalled, has advocated in these columns the creation of a permanent, even-numbered arbitration court. The board of arbitration in the enginemen's dispute recommended the creation of permanent wage commissions. It has been objected to proposals such as these that if such a court should render a few decisions in favor of either the railways, on the one hand, or their employees, on the other, it would become suspected of bias and its usefulness would be diminished. On the other hand, it has been contended in favor of a permanent commission always composed of the same members that it would have the advantage of becoming an expert body. Another suggestion that has been urged is that wage controversies should be settled by the same body that settles rate controversies, namely, the Interstate Commerce Commission, because it is desirable that the same body should look at both sides of the railway ledger.

It would seem that an arbitration board composed as suggested in the provision above outlined would meet many objections and have many advantages. As three of its members—the chairman of the Interstate Commerce Commission, another member of the commission, and the labor commissioner of the United States—would be practically permanent, they would acquire expert knowledge. As two of them would be members of the Interstate Commerce Commission they would help to enable the commission to look at both sides of the railway ledger. As each board of arbitration would include two representatives of the public who had not served on previous boards, there would be less danger of the board falling under suspicion of being biased in favor of one side or the other. These five members representing the public would constitute a clear majority. The addition of one member representing the railways, and one representing the employees would help the board to get, better than it otherwise could, the points of view of both parties.

Immediately after the appointment of the board of arbitration the chairman shall promptly convene it, and the board shall in such manner as it thinks advisable make thorough and expeditious inquiry into all the facts and circumstances connected with the difference and the causes thereof, and shall consider what is reasonable and proper to be done by both of either parties with the view of putting an end to the difference and to prevent its recurrence, and shall with all reasonable diligence make a written report to the Interstate Commerce Commission setting forth the various proceedings and steps taken by the board, and its findings, including the cause of the difference and the board's recommendations with a view to its removal and prevention of its recurrence.

The Interstate Commerce Commission shall cause a report to be filed in its office and a copy thereof to be sent to each party to the difference and to any municipal corporation, or to the representative of any newspaper who may apply therefor.

Any other person shall be entitled to a copy on payment of the actual cost thereof.

The desirability of having all regulation of railways concentrated as far as may be reasonably practicable in the hands of the Interstate Commerce Commission, of having a permanent record of all the evidence taken, the findings made and the opinions rendered, and of having the attention of the Interstate Commerce Commission directed to the labor situation as well as to the railway rate situation, argue for the above provisions.

For the purpose of inquiry the board shall have all the power of summoning before it witnesses, and of requiring them to give evidence on oath, and, in general, shall have the same powers in respect to enforcing attendance of witnesses and production of testimony as are vested in any civil court.

Provision shall be made for payment of members of the commission and for expenses of witnesses.

No counsel or solicitor should be entitled to appear before the board except with the consent of all parties to the difference, but the parties to the difference may appear in person or by agents.

Courts should not have any jurisdiction to recognize or enforce or to receive in evidence any report of the board of arbitration or of the mediation commission.

The reasons for most of the foregoing provisions seem obvious. That providing that the courts shall have no jurisdiction to enforce awards is, of course, intended to make clear that while mediation and arbitration, if necessary to a settlement, are to be compulsory, there is to be no compulsion to give effect to the award. The enforcement of obedience to reasonable awards may safely be left, for the present, at least, to public opinion. The foregoing proposed provisions are offered tentatively for consideration and discussion.

## NEW BOOKS.

*Railroad Construction.* By Charles Lee Crandall, professor of railroad engineering, Cornell University, and Fred Asa Barnes, assistant professor of railroad engineering, Cornell University. Size 6 in. x 9 in., 321 pages, 81 illustrations, cloth bound. Published by McGraw-Hill Book Co., New York. Price $3.

The authors have expanded into book form a series of notes which have been used for instructional purposes at Cornell University. It has not been felt until recent years that construction methods were sufficiently standardized to warrant the publication of such a book, and frequent revisions were made in the notes. The work of the American Railway Engineering Association and the very general exchange of ideas among railway engineers in recent years, has done much to make the practice on the various roads practically the same. The field covered by the book is a large one, and it is obviously impossible to treat each branch as exhaustively as is done in special books devoted to each of the various subjects. For class room instruction, which is perhaps the field in which the work will find direct application, and for young engineers who are not fortunate enough to be employed by a company which issues elaborate sets of standards, the book should furnish a valuable summary of methods of handling railway construction. It is divided into 10 chapters. The first is a general introduction covering estimates, classification, shrinkage, the mass diagram and overhaul. The chapter on earthwork considers briefly the various methods in current use for moving earthwork, with some typical cost data for each. Rock excavation, tunneling, masonry foundations, culvert and bridge masonry, trestles and bridges and track material and roadbed are each covered in a similar way in separate chapters. The last chapter is devoted to estimates and records with some miscellaneous matter. The book contains numerous references to current literature and the proceedings of engineering societies, and there is a bibliography covering the matter treated in each chapter.

*Hand Book of Railroad Expenses.* By J. Shirley Eaton. McGraw-Hill Book Co., New York. Flexible leather binding. 555 pages, 7½ in. x 5 in. Price, $3.

Mr. Eaton's book on Railroad Operations—How to Know Them was for a good many years a standard book on railroad operating expenses as given in the annual reports made by the companies to their stockholders. Since the Interstate Commerce Commission has put into effect its uniform classification for operating expenses and for other accounts of railroads, a good many changes have been made by some roads in their system of accounts, and Mr. Eaton's earlier book became to a certain extent obsolete. In the present book is included Mr. Eaton's exposition of the various items under operating expenses and also the text of the Interstate Commerce Commission's classification of operating expenses, income account, balance sheet, etc. Under operating expenses the full text of the commission's classification and instructions is given, and there are incorporated in this text revisions which the commission has issued as supplements to its original orders. One hundred and fifty-two pages of the book are devoted to an index which is very complete. Mr. Eaton says that all existing indexes of expenses have been freely drawn on and acknowledges especially his indebtedness to the index in use on the New York Central & Hudson River.

The greatest importance of this book lies in this index. There has been a very distinct need, ever since the Interstate Commerce Commission promulgated its classification of expenses, for a field book of operating expenses. This book of Mr. Eaton's appears to supply this want admirably.

# Letters to the Editor.

## AIR HOSE AND AUTOMATIC CONNECTORS.

ST. LOUIS, Mo., March 3, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

A number of articles have appeared recently in the *Railway Age Gazette* pertaining to economy in railway operation. Among them is an exhaustive article on "Air Hose." The maintenance of this particular equipment is shown to be enormous, but no definite solution has been offered as to its reduction, there being a difference of opinion as to whether or not under the present system of air couplings it would justify the railroads to invest in a better grade of rubber, owing to the severe abuse the hose is subjected to.

Eight months is the average life of an air hose, and it is very improbable that a more expensive hose would be economy in the long run, until the cause of an acknowledged fifty per cent. of hose failure has been eliminated; i. e., pulling couplings apart instead of uncoupling. The only permanent cure of the hose problem is automatic train pipe connectors. A practical automatic connector would reduce the physical abuse of the hose to a minimum and render the pulling stress on a hose impossible.

The hose question, however, passes into insignificance when compared with the real economy of automatic train pipe connectors. "Motion means money" is the slogan of one of our leading railroad men, and the automatic train pipe connector illustrates the statement strongly. There are approximately three million cars in the United States. Assume that one-half of this number are in service and that the air and steam hose are coupled and uncoupled once daily. Allowing the lowest possible average, it takes three-quarters of a minute to couple or uncouple the present hose connection. This shows that one million one hundred and twenty-five thousand minutes are consumed daily in operating the present hose connectors, which equals over two years. Figure this for one year and the result is over seven hundred years. The safety feature of such a device must also be taken into account and this will save a few more thousand dollars annually. While the efficiency engineer is at work, it would be well for him to give some thought to automatic connections for air and steam hose.

A. H. BURCHARD.

## JAMES J. HILL'S STATISTICS.

BALTIMORE, Md., February 28, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

One notes in your issue of February 21 a criticism by William J. Cunningham, assistant professor of transportation, Harvard University, of some of James J. Hill's transportation statistics. Mr. Cunningham undertakes to show that Mr. Hill's comparison of the rate per ton per mile of the United States with those of Prussia-Hesse and of the North-Eastern Railway of England is misleading because the Prussian and English rates include receipts from the service done in this country by the express companies; also because the English freight rate includes a collect and delivery service which the railroads in this country leave the shipper to do for himself. We do not think Mr. Cunningham has made much of an impression on the substantial correctness of Mr. Hill's statements for the following reasons:

(1) Mr. Cunningham is evidently not aware that some of the important railroads in this country are collecting and delivering freight for shippers out of their already meager freight rates.

(2) He overlooks the fact that both England and Germany have, and have had, for many years a parcels post very extensively used by the public. It is therefore very misleading of Mr. Cunningham to suggest that the European rates per ton per mile cover the whole service that in this country is done by the express companies. A large part of the high paying light weighing stuff goes into the post office and the railroads only get a part of the revenue on this. If they did all that the express companies have done here their average freight rate per mile would be higher.

Beyond this there are numerous and varied charges in Europe for use of station and other facilities, which are practically nonexistent in the United States, and it is exceedingly doubtful whether these are included in the European freight rate per ton per mile. I refer to such charges as hire of sheets (tarpaulins), counting fees, weighing fees, advice-note fees, cost of waybill forms and stamps for same, all of which are additional to the freight rates and probably are reported under miscellaneous collections, thereby escaping inclusion in freight revenue.

It is the more misleading in that Mr. Cunningham permits himself to state that if the express business, both tonnage and revenue, were added to the freight business of the railroad companies the effect on the average ton mile rate "would be startling." Approximations of the ton mileage and the actual gross revenues of the express companies are now readily accessible, and it is therefore possible to state that inclusion of the express companies' business with the railroad companies' business would increase the rate per ton per mile on the whole business to about 8 mills, or 7 per cent. more than the rate per ton per mile secured on the freight business of the railroads in the United States for the year 1910. It will be observed there is still a very long way to travel in order to reach the 1.37 cents of Prussia-Hesse or the 2.30 cents of England. The slight increase on inclusion of the express business hardly seems to warrant the use of so strong an adjective as "startling" to describe the effect of the express business on the general average rate per ton per mile.

(3) But whatever additional service the European freight rates may cover, such additions are much more than fully cancelled when consideration is given to incomes in the two countries expressed in a common currency to obtain numerical relation. All incomes are from 50 to more than 100 per cent. lower in Europe than here with prices to correspond. A mere comparison therefore of incomes or freight rates stated in United States currency and where the European figures have been converted at the par of international exchange leaves out of the reckoning a very important factor in the equities of the case, that being what figure 1.37 cents cuts in the German income or price, and what 8 mills in the United States income or price. Of course to arrive at a conclusion on this point it is necessary to take account of the usufruct the United States railroad gets out of the ton of freight, for this has a direct bearing on the rate per ton per mile. Allowing therefore twice the haul to United States railroads, as per Mr. Cunningham, which approximates the actual figures, we still find that the United States railroad burdens income and prices less than the German railway. The United States haul being 140 miles, we have 140 multiplied by 8 mills, or $1.12, as the transportation charge in the United States; similarly the German haul being 70 miles, we have 70 multiplied by 1.37 cents, or 96 cents as the transportation charge in Germany; but 1.12 is only 1.12 per cent. of 100 (United States price or income), while 0.96 is 1.92 per cent. of 50 (German price or income), and as 1.12 is only 60 per cent. of 1.92, it seems plain the United States railroad is 60 per cent. kinder to the United States income or price than is the German railway to the German income or price—this, too, after tacking on express rates to railroad rates in the United States.

Mr. Cunningham's undertaking to show that when Mr. Hill calls attention to the fact that in the United States we move 272 tons one mile for every dollar of net revenue, while Germany only moves 172 tons, France 88 tons, and Great Britain but 58 tons, is advancing a comparison of no value and seems to be rather a splitting of hairs, especially in the case of the comparison between the United States and Prussia-Hesse. The difference between the United States 23 per cent. of operating revenue coming from passengers and the Prussia-Hesse 29 per cent. of operating revenue from the same source is too slight to materially lessen the gap between the 272 tons one mile of the United States and the 172 tons one mile of Germany. We do not think Mr. Cunningham's pronunciamento on this point has lessened the *comparative* value of Mr. Hill's figures.

M. B. WILD,
Statistician, Baltimore & Ohio.

# OXY-ACETYLENE WELDING AND CUTTING.

**Recent Observations of the Development of This Art in European Commercial and Railway Repair Establishments.**

By Henry W. Jacobs.

One development which was apparent in European railway practice, and which is undergoing the most thorough revolution in Germany was the application of the oxy-acetylene blow pipe to metal working of all kinds. Not only is the process being repeatedly applied wherever it is found to benefit the work, either in economy or quality, in various railroad shop operations, but it is also causing a revolution in many of the industrial metal working trades.

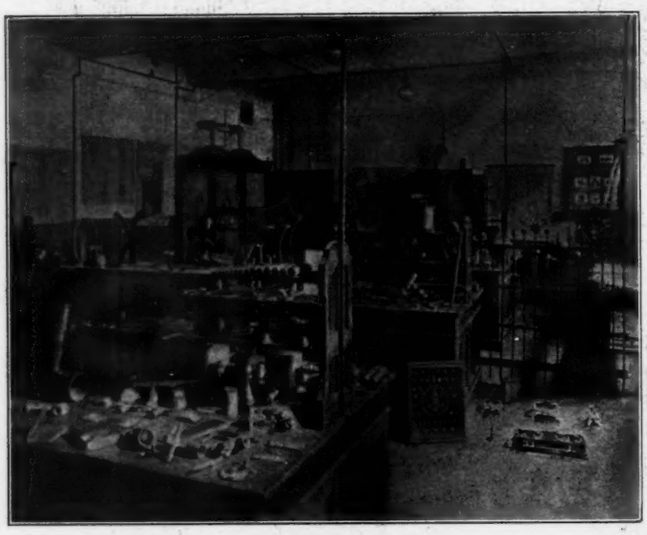
During the past ten years the whole practice of metal cutting throughout the world, and particularly in America, has been greatly improved by the introduction of the high speed tungsten alloy tool steels, there being scarcely a railroad shop in the United States that has not increased its production and cheapened its costs in such matters as turning tires, knuckle pins, boring cylinders, etc. Great as are the changes in shop practice due to high speed steels, the revolution that will be worked in the treatment of all kinds of metals by the oxy-acetylene flame in the forming, building up, repairing of worn or fatigued material, cutting apart and joining together, and, in fact, all kinds of metal forming and working, is bound to far overshadow it.

**The New Royal School of Machine Construction at Cologne, Germany.**

For instance, in the piping of buildings for all purposes, and whether the pipes are of iron, steel, or some non-corrosive material, metal working is undergoing a complete metamorphosis from the ground up. Piping heretofore used has walls relatively thick compared with its inside diameter, necessitated by the method of joining the ends of the lengths of pipe together, which consists in cutting a thread on the end of the pipe so that it may be screwed into a coupling, elbow, or tee; the depths of these threads determines the thickness of the pipe wall. With pipes or tubes that may be joined together by being oxy-acetylene welded this thickness is not necessary, and a tube of thinner material may be used. These thin walled pipes are easily rolled and butt welded from the strip. I was told that this method of making these thinner pipes was more economical than the present method of making wrought iron or steel piping used for water, gas or steam purposes. Flat bands of steel or iron are run through rolling machines to the desired diameter, and are then put through an automatic machine and oxy-acetylene butt welded.

In place of having unions, elbows and couplings, as is the present practice in piping a building, these are eliminated and the joints are welded as the piping is being put in place. It will be readily seen that with this method there is no chance of leaks due to threaded connections, and as the walls of the piping are thinner, a great saving is accomplished in the first cost of the pipe. When pipe is applied in a building, all of the joints and connections are as easily made in place as a wiped lead joint, and are much neater and stronger in proportion to the metal dealt with. I was informed by those in charge of this kind of work that joints made in this way were done more quickly and cheaply than with the threaded connections.

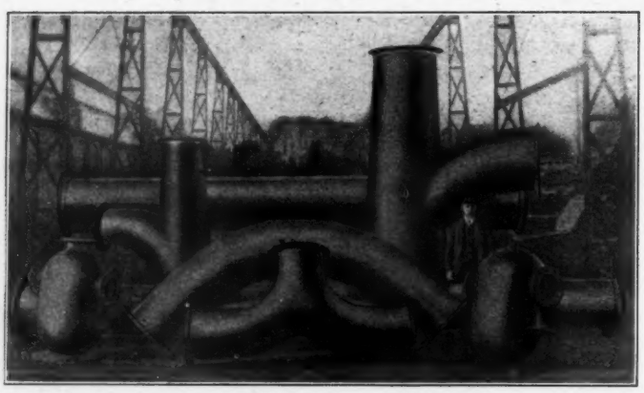
To indicate the scale on which this oxy-acetylene piping is being applied in buildings, the High Court of Justice building, located at Cologne, has 8 kilometers, or over 5 miles of welded piping and joints in it; and plumbers and pipe workers from all over Germany, and in fact from the other countries of Europe, are becoming expert in the new method as rapidly as they can. Pipes for railway usage may thus be applied in roundhouses, shops and water service installations, eliminating the losses due to compressed air, steam and water leaks—there being no me-



**A Collection of Oxy-Acetylene Welded Articles in the Royal School of Machine Construction at Cologne.**

chanical joints. The application of oxy-acetylene welding to piping is given as a striking example of the use of the new process, although it is only one of thousands that might be cited.

With the far-sightedness and the thoroughness with which the Germans prepare for any change in their methods, they easily recognized the importance of proper and careful training in the practice of doing this welding work. The Royal Prussian government has co-operated, and, to an extent, endowed and sup-



**Examples of Large Heavy Piping Manufactured by Oxy-Acetylene Welding at the Works of A. Borsig in Tegel near Berlin.**

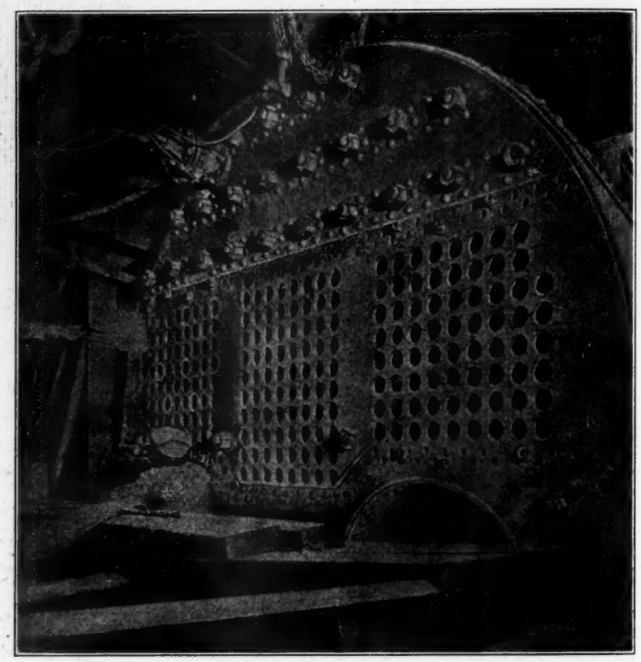
ported the foundation, first of a special advanced course in one of the largest technical industrial schools, where investigation and instruction as to the best and most skillful manner of applying oxy-acetylene welding and cutting to the different trades has been completely worked out. This school is known as the Königliche Vereinigte Maschinenbauschulen at Cologne. The first course in the new art was given in May, 1909, and since that time 29 successive courses of instruction in the different trades have been given. In the winter of 1911-12, for instance, 464 men from various trades and walks of life took this course at this particular technical school—this in addition to those receiving instruction at the 21 other Royal Prussian technical or trade schools, and also in addition to the instruction given in similar schools in the other German kingdoms.

The subdivision of these 464 students was as follows:

| | |
|---|---|
| Factory owners | 78 |
| Factory managers and engineers | 125 |
| Foremen | 116 |
| Mechanics | 113 |
| Students | 27 |
| Others | 5 |

Another classification according to the kind of trade is as follows:

| | |
|---|---|
| Boiler inspectors | 17 |
| Boiler workers, etc | 118 |
| Coppersmiths | 18 |
| Blacksmiths | 12 |
| Machinists | 50 |
| Ship-builders | 12 |
| Pipe workers | 11 |
| Electricians | 9 |



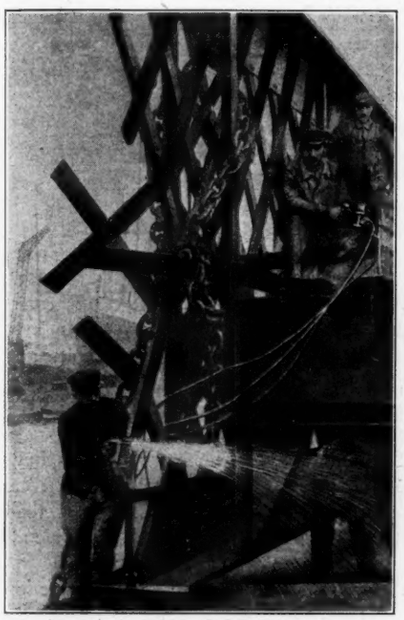
**Replacing Flue Sheet of Marine Boiler by Oxy-Acetylene Welding on the Steamship "Sanai." At the Right the Welding Is Completed, While at the Left It Is in Progress. Flue Sheet Is One Inch Thick.**

| | |
|---|---|
| Bicycle and automobile mechanics | 11 |
| Safe makers | 6 |
| Locksmiths | 44 |
| Employees of foundries and rolling mills | 8 |
| Gas works employees | 6 |
| Gun makers | 1 |
| Aluminum workers | 12 |
| Carbide manufacturers | 1 |
| Teachers in technical schools | 27 |
| Master foremen in technical schools | 21 |
| Merchants and others | 47 |
| Plumbers | 33 |

There is just now being founded at Nuremberg a special school devoted exclusively to practical and theoretical instruction in this new art, the first building appropriation being about $40,000. In this school, as in all of the others throughout Germany and the rest of Europe, the instruction is being carried out along the best standard lines, each school being advised uniformly of the latest and best developments in the practice of oxy-acetylene welding, and through yearly meetings and reports from all of the schools and industries, the best developments are taken advantage of by everybody, and a very rapid general introduction of the art is being made.

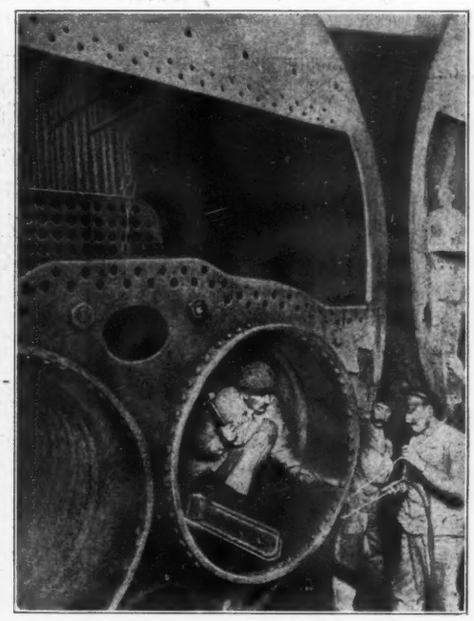
One of the illustrations shows a typical example of the saving that can be made by oxy-acetylene welding of large broken

gray iron castings which are too large to carry in stock for replacement. The sketches show a low pressure cylinder for a blower engine in a rolling mill. This cylinder broke as indicated. To cast and machine a new cylinder would have meant a delay of a month and would have thrown 400 men out of work for that time. The welding of cracks in a large complicated casting like this represents a very difficult feat, because of the tendency of cast iron to develop new cracks in the neighborhood of the weld. This is due to the strain set up in the metal when the casting cools after welding. To overcome this the cylinder was covered with asbestos on the outside and kept at a dull red heat by a wood fire inside of the cylinder, while being welded by the oxy-acetylene flame. The operators wore wooden shoes and heavy felt gloves and worked behind asbestos shields to protect themselves from the heat. After the weld was completed the cylinder was covered with insulation and allowed to cool very slowly. After two days the insulation was removed and the welds were found to be perfect. The cylinder was then given a hydrostatic and a severe endurance test, both of which were stood without a sign of a flaw.



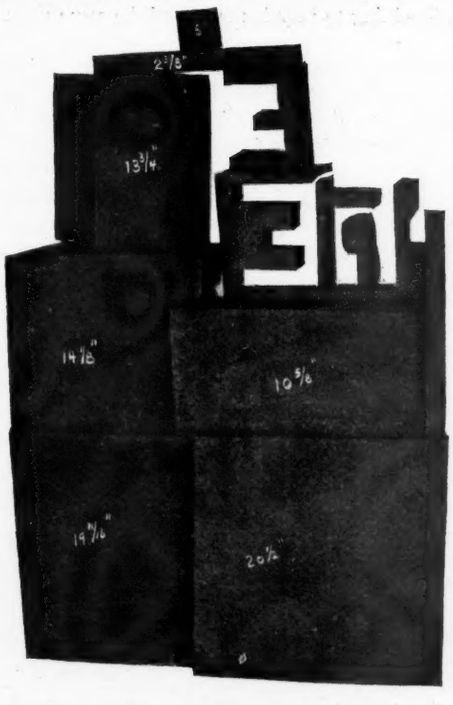
**Cutting Up the Bellot Bridge with Oxy-Acetylene Blow Pipe at Havre, France.**

**Main Base Casting of a Shear (Cast Iron) After Being Repaired with the Oxy-Acetylene Blow Pipe.**

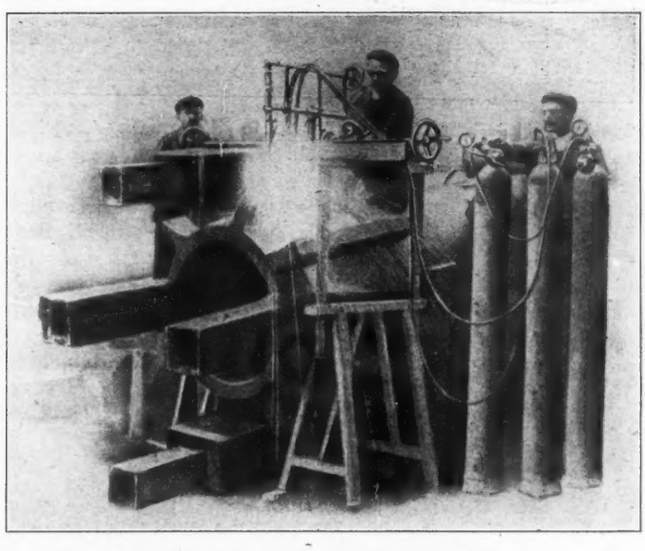


**A Marine Boiler After Cutting Out Damaged Flue Sheet with Oxy-Acetylene Blow Pipe.**

In railroad work applications are made to the welding of safe ends to flues; in the filling up of pitted spots on flues after they have been rattled; in the cutting out of all kinds of holes in steel sheets, such as fire-door holes before flanging; cutting out between frame jaws in plate frames; various classes of boiler repairs; equipping wrecking outfits with apparatus for cutting; welding together of cylinder and valve chest covers, dome covers, metal tool boxes, metal shovel handles, etc., and repairing blow-holes in all kinds of castings as is now done in the United States; and, in fact, an innumerable variety of work where it is required to cut two pieces of steel, iron or other metal apart, join them together, or add metal to worn or broken



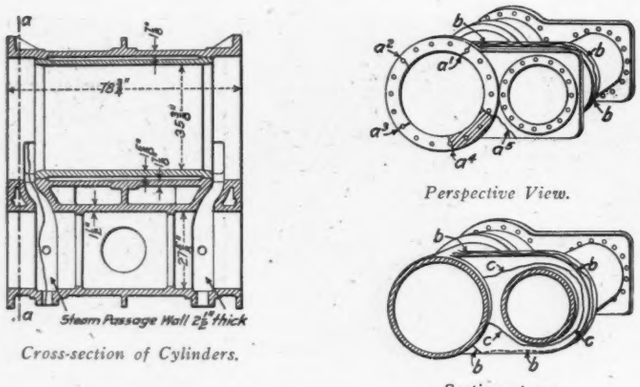

**Cutting Done by Oxy-Acetylene Blow Pipe.**



**Cutting Off the Riser from a Large Gun Carriage.**

parts, or parts needing bosses or shoulders instead of having to use an originally thicker piece of metal.

Although I had letters of introduction from the best sources, and was freely admitted into the works where these processes were generally employed, I found that where manufacturing concerns had specialists on certain articles and had been able




*Cross-section of Cylinders.* *Perspective View.* *Section at a-a.*

**The Cracks in This Low Pressure Cylinder of a Rolling Mill Engine Were Repaired by the Oxy-Acetylene Process.**

to reduce the cost of production very much through the art of oxy-acetylene welding, strangers were not admitted to the plants, and the art was guarded as a sort of trade secret, showing the value attached by manufacturers to some of the most important developments of the process so that they might retain some advantage over competitors.

**Cutting a Hole Through a Boiler Plate with an Oxy-Acetylene Torch.**

In conclusion I would strongly urge the railroad mechanical department officers and mechanical engineers who will attend the meeting of the American Society of Mechanical Engineers, to be held in Europe this coming summer, to take advantage of the opportunity to visit the industries where the art of oxy-acetylene welding is being practiced.

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Railway Extension in Trinidad.—Work on the extension from San Fernando to Siparia was somewhat delayed until the middle of January by the continual heavy rains, and only one of the three locomotives used for carrying materials has lately been in use. Ballasting the track especially has been delayed, and there are two 120 ft. span bridges yet to be completed on the line.

## THROUGH ROUTES ESTABLISHED.

*St. Louis, Springfield & Peoria et al. v. Peoria & Pekin Union. Opinion by Commissioner Meyer:**

The complainants are interurban electric railways under the common management of the Illinois Traction system. They have both passenger and freight terminal facilities in Peoria, Ill., and also a physical connection with the lines of the defendant. At present, however, there is no interchange of traffic between the complainants and the defendant, and the complainants request the commission to require the defendant to permit the complainants to construct a new physical connection as the present connection would not be adequate; and further to require the defendant to establish through routes and joint through rates and to exchange interstate traffic. The complainants' equipment and facilities will permit interchange with a standard gage steam road. The defendant conducts a general terminal transfer business in Peoria for the steam railroads which enter that city, and for the use of its property it charges $22,500 a year to roads which have no terminal facilities in Peoria. Two roads have freight terminals in Peoria, but no passenger terminals, and they pay the defendant for the use of its passenger terminal $2,000 a year. The lines of the Atchison, Topeka & Santa Fe connect with the defendant's lines at Pekin, and by paying a switching charge of $3 per car the former is enabled to have its traffic delivered at Peoria and to receive traffic therefrom. What the complainants request is nothing more nor less than an arrangement similar to that which exists between the defendant and the Santa Fe.

The commission found that the construction of a connection at the point mentioned in the complainants' brief is reasonably practicable; that it could be put in with safety, and that sufficient business would be offered to justify its construction and maintenance. The defendant contended that the commission was without authority to grant the relief sought by the complainants, because the compelling of switch connections did not apply to all roads but only to lateral branch line roads; and that the complainants' lines are not lateral branch lines, and are therefore not entitled to the use of the defendant's facilities, except upon such terms as the defendant sees fit to offer them; also that the defendant has the right to absolutely refuse the use of its terminals and facilities to complainants, but that it is willing to permit the use of the same upon the same terms as the roads which enter Peoria, but which have no terminal facilities there, are using them. The commission found that as the complainants' lines were independent lines and not lateral branch lines, the request for the switch connection should be denied. The question to be decided was whether this was a case in which to order the establishment of through routes between the complainants and the defendant over the existing connection. If the connection is not sufficient to render the service which the law requires, both carriers are under obligation to render the facilities adequate. The defendant asserts that the complainants seek the use of its terminals as embraced in the contract for which other roads paid $22,500 a year, for a compensation less than that sum. The commission did not agree with this assertion, as the complainants have their own facilities in Peoria, as previously mentioned. Owing to the present lack of interchange, interstate traffic shipped via the complainants and the defendant involves long drayage hauls and excessive loading and unloading. The commission disagreed with the argument of the defendant that when the defandant was required to transport traffic between the complainants' terminal and points on its line it was giving the complainants the use of its track and terminal facilities within the meaning of the third section of the act to regulate commerce. The commission found that shipments moving interstate generally pass through one or more terminals, and that the contention made by the defendant,

*Though this decision of the Interstate Commerce Commission is abstracted, the original language is preserved insofar as is possible.

if admitted, would completely nullify the power of the commission to establish through routes. The commission found further that the defendant now discriminates against the complainants in favor of the three roads which at present use only a portion of the defendant's facilities, and that this practice showed that the defendant recognized the difference between an interchange, such as the complainants want, and the use of its terminal facilities as defined by it. The commission decided that the defendant has not the privilege to accord one carrier an interchange of traffic and to deny such an interchange to a competitor of that carrier, or to accord one carrier the use of part of its terminal facilities and to deny such use to another.

The defendant asserted that it has the right to "absolutely refuse" the use of its terminal facilities to the complainants. The commission found that though the terminal facilities of the defendant were private property, they were devoted to public use and were therefore subject to regulation. If the defendant had the right to refuse the use of its terminals and facilities to the complainants it could also refuse such rights to all other steam roads entering Peoria and literally seal Peoria through the instrumentality of its rails and hold that community as a closed domain. If a carrier receives fair compensation for service, how could it be claimed and argued that its property was being confiscated as a result of compulsory performance of such service? The commission found further that a common carrier is bound to accept a car for transportation whenever such car is offered at places where it can reasonably receive it. To determine whether or not it will transport the car the carrier cannot lawfully inquire into the ownership and origin of the contents, nor into the route over which it has been moved in order to reach its rails; it can only ask that it be given reasonable compensation for the service performed. The defendant in effect endeavors to compel the complainants to pay for services and facilities which they do not desire and of which they cannot make use. The commission decided that a common carrier cannot arbitrarily require the purchase of its services when they are not wanted. The commission decided that the complainants are entitled to through routes and through rates with the defendant, that they are entitled to through routes on interstate traffic passing through Peoria to points on their lines and from interstate points to industries on the lines of the defendant in Peoria, and from such industries to interstate points reached by the complainants. If an agreement in regard to the rates is not made within 60 days, further proceedings will be had with a view to the issuance of a proper order.

Commissioner Prouty concurring, said in part: The defendant is properly a belt railroad; it was constructed for the express purpose of giving main-line railroads access to the various industries in and about Peoria; it has no main line, and it is entirely immaterial to it by what connecting railroad the main-line haul is performed. The commission may properly establish through rates to and from industries upon a terminal railroad of this character. The commission may order the through service, leaving the parties to provide the necessary connections. At any rate it is clear to me that the defendant should be required to handle the business of the complainants upon fair terms, and this commission should at least attempt to compel this. If we mistake in the making of our order the defendant has ample protection in the courts, while, if we err by denying the petition of the complainants it is not clear that this error can be corrected. (26 I. C. C., 226.)

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RAILROAD EXTENSION IN SPAIN.—Under a recent concession the Alcoy & Gandia Railroad secured the right to construct and operate without government subvention a 12½ mile extension from Gandia northward along the coast to the town of Cullera. Work is under way, and when completed it will give Gandia a second route to Valencia, put the coast points in closer touch with the important fruit district of Alcira, and in general will establish more efficient communication between Valencia and the numerous agricultural communities to the southeast.

## ARBITRATION OF THE FIREMEN'S WAGE CONTROVERSY.

The arbitration, under the Erdman act, of the controversy between the locomotive firemen and the eastern railroads was begun at the Waldorf-Astoria Hotel, New York, last Monday. W. W. Atterbury, the member of the arbitration board appointed by the railroads, and Albert Philips, appointed by the firemen having failed to agree on a third member, William L. Chambers, formerly chief justice of the International Court in Samoa and a member of the Spanish Claims Commisison, was chosen, under the law, by the presiding judge of the Commerce Court and the acting commissioner of labor, acting jointly. There appeared for the firemen W. S. Carter, president, and Timothy Shea, assistant president of the Brotherhood of Locomotive Firemen and Enginemen. For the railroads there appeared Elisha Lee, assistant to the general manager, Pennsylvania Railroad, who is chairman of the conference committee of managers. Mr. Lee will be assisted, as occasion may arise, by his colleagues on the committee. Under the terms of the Erdman act the arbitration must be closed within 30 days from the date of the appointment of the third arbitrator, which was March 3, so that unless both sides agree to an extension of time, the decision will be announced by April 2.

Judge Chambers was selected as chairman by the other two members of the arbitration board. In his opening remarks he said, in part: "I am, of course, entirely ignorant of every question and every fact connected with this arbitration. My first consultation with anybody about the case occurred within the last hour with my colleagues. I do not own a share of railroad stock, nor a bond of a railroad, and I have paid my fare on railroads all my life. I have many close and intimate friends among the officers of railroads and I have perhaps as many in the brotherhood. If I were not a lawyer I expect I should be a railroad employee. We expect these proceedings to go along, not only peaceably, but with that feeling which I know from experience really exists between the railroad managements and the brotherhood. I have presided in a number of arbitrations, not only under the Erdman act, but in several other instances, and with very rare exceptions I have found that both the representatives of the railroads and of the brotherhoods have been controlled by high principles and a sincere desire to reach conclusions to the general interest of the railroads and the brotherhoods and equally in the interest of the public. In a sense I feel that, as the presiding arbitrator, I represent the public.

"The proceedings will be along the line of court proceedings, but not with the strict application of court rules. We are going to admit evidence which, in a court of justice, might be ruled out because it was hearsay or irrelevant. Our desire is to learn everything possible about the facts in the case. I believe my colleagues are as impartial in this investigation as I am myself. . . ."

In opening the case for the firemen, Mr. Carter emphasized the point that the firemen's requests had been twice amended; had they known what the final method of settlement would be they would probably have presented larger claims. Samuel T. Steinberger, a clerk in the general office of the Brotherhood at Peoria, was the first witness. He said that he had prepared a statement showing regulations and rates of pay existing on lines participating in this arbitration as compared with those of western lines and with the rates now asked for. It was evident that Mr. Carter's purpose was to emphasize the higher rates and more favorable conditions on western roads as compared with those in the East. Mr. Steinberger gave averages of the pay received by the firemen on different classes of engines according to weight on drivers for both the west and east, against which Mr. Carter set the demands now made, showing that they were based on the western rates, but were a little lower. The rates for the eastern roads gave no information regarding the practice with heavy freight locomotives seldom used on passenger trains, but the present demands include rates for such engines, in such work;

and no rates were given for the present demands for freight service in the case of locomotives weighing 200,000 lbs. or more on drivers, as in this case two firemen are asked for. In the cross-examination, Mr. Lee brought out objections to the methods used in obtaining the average rates shown in the tables. Asked by Mr. Lee if he considered it fair to compare the eastern and western rates in this way, Mr. Steinberger admitted that it was not exactly correct, but it was as near as he could get to it. Mr. Lee then informed the board that the railroads objected to the method used in obtaining the rate and promised to submit a correct statement.

The next witness was J. W. Lott, of Elkhart, Ind., employed on the Lake Shore & Michigan Southern as fireman and extra engineman. On that road a fireman is called two hours before the leaving time of his train in freight service and three hours before in passenger service. It is part of the fireman's duties to put the tools on the engine and fill the lubricator. The witness claimed that this work should be done by someone else, and characterized the filling of lubricators as dangerous. On the division on which he worked, which is 95 miles long, 75 per cent. of the trips on freight trains occupy, he said, from 12 to 16 hours. The witness also admitted that given the same tonnage, a locomotive with a superheater burned less coal than a similar locomotive using saturated steam, but he claimed that the superheater locomotives actually burn just as much coal as the others, as they haul heavier loads. He also claimed that those equipped with superheaters are no better at starting a heavy train than those using saturated steam.

E. L. McGinnis, a fireman on the Pittsburgh division of the Pennsylvania Railroad, said that on that division, in the last few years, there had been an increase of 200 tons in the rating of certain locomotives without any changes being made in them.

Mr. Cory, a fireman on the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., said that he had been told by the road foreman of engines, in taking up the matter of a fireman being called out of his turn, that the firemen broke the rules daily regarding the cleaning of locomotives and that therefore the company could not be held to account for breaking other rules.

James A. Bell, New Castle, Pa., a fireman on the Pennsylvania Lines west of Pittsburgh, gave testimony regarding the difficulty of a fireman's shoveling coal ahead on freight engines. Cross-examined by Mr. Lee, he admitted that there had been four recent increases in wages, but claimed his wages would not go any further now than previously.

David May, of the Baltimore division of the Baltimore & Ohio, gave similar testimony to that of Mr. Lott regarding superheaters. He said that on his division automatic stokers had been a failure; but he believed the locomotives so equipped were now working satisfactorily on another division. He caused considerable amusement when he declared that a thermometer which he carried on the locomotive during the summer had burst from the heat when passing through a tunnel.

W. F. Heckenberger, a fireman on the Philadelphia division of the Pennsylvania, said that in cases of accident both enginemen and firemen were disciplined, but admitted that the enginemen were held principally to account.

J. E. Weaver, of the Lake Shore & Michigan Southern at Elkhart, Indiana, said that firemen are frequently disciplined for making black smoke in Chicago. He claimed that the poor quality of the fuel was to blame. He said that it was often necessary for the fireman to assist the engineman in reversing the large engines. This completed the testimony for the first two days.

C. A. Kauffman, of the Philadelphia division of the Baltimore & Ohio, was the first witness called on Wednesday morning. He stated that at his terminal there was no difficulty in getting supplies placed on locomotives previous to a trip, but he understood there was trouble at some terminals of the road. He stated that there had been a great reduction in the number of engine crews since the introduction of the Mikado type locomotives. F. A. Murphy, of the Cumberland division of the Baltimore & Ohio, followed. He said that a number of locomotives on that division are equipped with the Street locomotive stoker, but that they are not popular with the firemen and that the oldest men choose the hand-fired engines when they are available. He claimed that the stokers require constant attention and that therefore the firemen get no chance to rest while in sidings; that the fireman has to fire by hand about 50 per cent. of the coal burned, and that the coal that goes to the stoker must be dry and passed through a screen which will take nothing larger than 2½ in. square, requiring much labor in breaking coal. The dust resulting from this, he said, is excessive. On this division screened coal for the stokers is supplied at one terminal only. T. E. Ditto, also of the Baltimore & Ohio, said that several firemen on his division had been paid $1 per day extra to go to the Cumberland division to fire because of the difficulty of keeping men on the large locomotives there. His experience with the automatic stokers was confined to six trips. He also claimed that he could see no saving of coal under any conditions with a superheater. J. A. Davis and C. B. Hubler, of the Buffalo division, Delaware, Lackawanna & Western, both testified to the use of two firemen on certain large locomotives in road service, but these locomotives have since been placed in pusher service.

Warren L. Adair, a fireman on the St. Louis division of the Cleveland, Cincinnati, Chicago & St. Louis, testified regarding the use of the superheater. He stated that a superheater is satisfactory when new and in good condition, but that the large flues soon become blocked with cinders around the superheater units and leaks develop at the joints. On cross-examination by Mr. Lee he admitted that a saturated steam locomotive is as bad as one using superheated steam when in a run-down condition. In questioning Mr. Adair, Mr. Carter explained that he had to depend on firemen for the technical testimony regarding such devices as the superheater as he was unable to obtain a mechanical expert anywhere who was willing to testify on the men's side. Mr. Lee offered to lend him an expert for testimony but Mr. Carter refused the offer.

N. W. Ayers, of the Lake Shore & Michigan Southern, at Erie, Pa., said that three Street stokers in use on that road about a year and a half had been removed because unsatisfactory. He claimed the parts of the stoker were in the way and bothered a fireman in the performance of his duties. Firemen Lieban, of Harrisburg, Pa., and Lienhardt, of Tyrone, Pa., both Pennsylvania men, followed in the lines of several previous witnesses. E. G. Boling, of Terre Haute, Ind., a fireman on the Vandalia, stated that he had had no personal experience handling an automatic stoker, but had ridden a locomotive equipped with one for some time and watched its action. He did not state the type used, but claimed that conditions must be ideal in order to get satisfactory results. He said the stoker would only work satisfactorily with good coal, and compared its use with the instruction of a student fireman, saying that it was necessary to watch it closely and help out frequently by hand firing. Mr. Carter at this time added to his statement regarding his inability to obtain expert testimony, and compared the superheater and such devices with the compound locomotive, which, he said, after having cost "millions and billions of dollars" had been abandoned as unsatisfactory. He said that the superheater was supposed to make a saving in the fireman's work but that no such result was obtained, and classed it and the compound locomotive together as fads. When Mr. Atterbury said that information concerning tests at the Altoona testing plant of the Pennsylvania were available to Mr. Carter the latter replied that such results showed testing plant conditions only and were of no use for what he wanted. He then attempted to bring out, in questioning Mr. Boling, that bad water is worse to contend with on superheated than on saturated steam locomotives, owing to the scale forming in the superheater tubes and reducing their conductivity. J. M. Dunlevey, of the Pennsylvania division, New York Central & Hudson River, stated that the heat on the Mallet compound locomotives which he fires is so intense that his overalls and trousers are frequently burned through. Mr. Carter suggested that the company make "an appropriation for pants" for the firemen on these locomotives

## EDGAR E. CLARK.

The reappointment of E. E. Clark to the Interstate Commerce Commission for another term of six years was noticed in our issue of March 7, page 451. On the eighth, Mr. Clark was chosen chairman of the commission for the current year, taking the place of Mr. Lane, who leaves the commission to enter the President's cabinet as Secretary of the Interior.

Mr. Clark has been a member of the commission for six years, and during that time has made a reputation for integrity, impartiality, and assiduous devotion to the duties of his position. These are essential qualifications for the head of this important body, and it is, therefore, to be expected that he will fill his new post with credit to himself, and to the interest of the public.

Mr. Clark was born in Lima, N. Y., February 18, 1856, and was educated at Wesleyan Seminary in his native town. He moved west in 1871, and began his railroad career as a brakeman. He was soon promoted and rose through the usual channels to the position of passenger conductor, which he held in 1889, when he was selected grand senior conductor of the Order of Railway Conductors, at the convention in Denver, Colo., in May of that year. The following year, 1890, he was chosen grand chief conductor; and he remained the head of the order up to the time that he was appointed by President Roosevelt a member of the Interstate Commerce Commission in 1906. As leader of the brotherhood Mr. Clark enjoyed an enviable reputation for fairness, public spirit and progressive views. During his incumbency the membership of the conductors' brotherhood increased from 12,000 to 38,000. While in this position Mr. Clark was appointed by the President a member of the Anthracite Coal Strike Commission of 1902, a body whose strong, yet conservative conclusions elicited the general approval of the country.

Edgar E. Clark.

For several years past Mr. Clark has had direct charge of that part of the commission's work which has to do with the compilation of the passenger and freight tariffs filed by the railroads and the administration of the regulations under which this very troublesome work is managed by the railroads. As the reader will recall from the last annual report, recently issued, the number of tariffs filed in 1912, which was 108,766, represents a reduction of more than 50 per cent. in the number issued, as compared with 1908; a reduction, accomplished only by the most persistent attention to innumerable details and in the face of constant objection and criticism, which has proved as beneficial to the railways, in the simplification of work and the reduction of expense, as it has to the people who use the tariffs in added convenience.

Mr. Clark is the first and only member of the commission who is familiar with the actual physical operation of a railroad. The first chairman, Judge Thomas M. Cooley, had been a receiver, but was essentially a lawyer and an economist; Commissioner Yeomans had been superintendent of a small road for a short time; and Commissioner Clements had been president of a small railway for one year; but the man who knocks around on freight trains for five or ten years, as did Mr. Clark, and who also has the qualifications of mind and character to rise to a position of leadership, gets a schooling and an experience which can be secured in no other way. He becomes familiar with the feelings and needs of the employees, and also with the views, motives and responsibilities of operating officers. At the same time he learns the feeling of the public—the railroads' patrons. As, during the past six years, Chairman Clark has become sufficiently acquainted with public sentiment in those phases wherein the railways do not satisfy it, to offset any undue sympathy with railroad employees which he may have had, we may now expect him to be the most impartial of judges. Evidence that he has the judicial temperatment we already have, as has been noted.

## BALTIMORE & OHIO IMPROVEMENTS.

Extensive improvements are to be carried out by the Baltimore & Ohio on the Somerset & Cambria division between Johnstown, Pa., and Rockwood, at a cost of about $1,500,000. The work will be started as soon as the consent of the city authorities of Johnstown can be obtained. The new passenger and freight houses and yards in Johnstown will more than double the present facilities at that place. There will be new passenger and freight facilities at Somerset, a number of long passing sidings, and five steel bridges; a new passenger station at Rockwood, and a new track, low-grade, between that place and Garrett. The passenger station at Johnstown will be of stone, 28 ft. x 100 ft. The freight house will be brick, 28 ft. x 300 ft., with concrete foundations. It will have covered platforms 14 ft. wide x 200 ft. long. The building will have a refrigerator room and two team tracks. A new roundhouse and other terminal buildings will be put up in Johnstown, which with yard improvements will cost $500,000. The yards will have a capacity of 240 cars. An engine house with a turntable 80 ft. long will be built, and there will also be a 70-ft. ash pit.

The new freight yard at Somerset is to have a capacity of 500 cars, and the roundhouse and other buildings at that place will cost about $400,000. Steel bridges will replace lighter structures at Holsople, at Skew, at Paint Creek at Hog Back Tunnel, and at Stony Creek. Work on the low-grade line between Rockwood and Garrett, to be 8 miles long and cost $500,000, has been started.

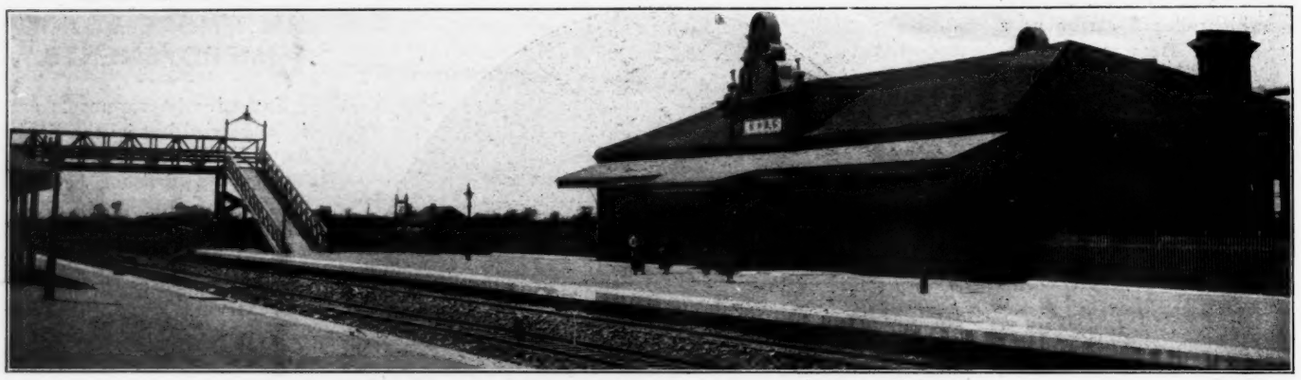
Regarding the recent report that the Baltimore & Ohio would spend $27,000,000 for new tracks and other improvements, an officer writes that the report was based on a tentative statement made by President Willard before the Public Service Commission of Maryland, referring to improvements that it may be necessary to carry out on the Baltimore & Ohio during this and future years.

# THE KIANGSU-CHEKIANG RAILWAYS.

**Progress That Has Been Made Towards a Modern System of Railroads, Remarkably Low Costs of Labor for Operation.**

By Lewis R. Freeman.

The railway question which China is facing today is not whether the thousands of miles of line, which are soon to be constructed, shall be built by foreigners or by themselves—that question seems already to have been settled—but rather whether they shall be built with borrowed or with Chinese money. The question will doubtless take a long time to decide, but eventually the Chinese will probably borrow the money for their great enterprises, retaining as complete control of the expenditures as possible, while the smaller lines will be financed and built by local capitalists.

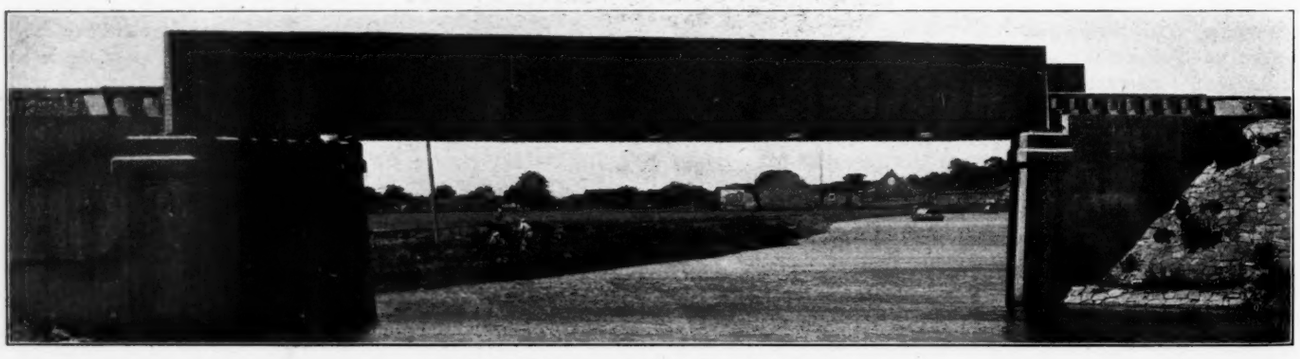


**Country Station, Showing Platforms of Concrete and Macadam.**

The Shanghai-Nanking Railway is undoubtedly the best built road in the Chinese Empire, a product of foreign financing and engineering, and now being largely operated under foreign direction. In the Peking-Kalgan, the Chinese government, taking advantage of men trained under European supervision, and using the profits of one of its own foreign built lines, overcame serious engineering difficulties and constructed a 132-mile line more economically than a similar work has ever before been done. In the present account of the Kiangsu-Chekiang Railway I shall tell something of a line—two connecting lines really—that was financed by the Chinese gentry of the interested provinces, built by Chinese engineers, and is now being operated without the aid, even in an advisory capacity, of a single foreigner. The most notable fact regarding these lines is that their cost of construction and operation have proved lower than those of any other important road in China.

The Kiangsu-Chekiang Railways, passing through a section of country almost identical in character with that traversed by the Shanghai-Nanking Railway, were built at a cost of approximately $20,000 a mile (the Chinese claim even considerably less than that figure) against $55,000 a mile for the British-built Shanghai line. Foreigners claim that the Kiangsu lines are poorly constructed in every respect, that the ballast is neither of good quality nor properly laid, that the ties are culls which could not be sold elsewhere, that the rolling stock is mostly a heterogenous collection of antiques from all parts of the world, and that such of it as is up-to-date is rapidly being ruined by incompetent and careless handling. The Chinese, denying all these charges, maintain that even if they were true the margin of advantage—$35,000 a mile—which their lines have over the Shanghai-Nanking Railway will allow them something to draw upon for renewals. The fact that the through line from Shanghai to Hangchow has operated for over a year now without any serious defects cropping out, and at a most handsome profit, cannot be lost sight of in passing on the merits of the question.

Foreigners in Shanghai shook their heads doubtfully when it was announced by the Chinese that the itinerary of the Pacific Coast Commercial Commission included a trip to Hangchow and back by a special on the Kiangsu-Checkiang Railways. They warned the Chinese that a railway accident, however trivial, at the outset of the visit might upset the plans for the whole tour and do irreparable harm. They finally induced our hosts to "minimize the chances" by arranging that the down trip should be made in house-boats via the Whangpoo and the Grand canal. Even after our arrival strenuous endeavors were made to arrange that the journey in both directions between Shanghai and Hangchow should be made in house-boats, but the plan of returning by train was adhered to by the Chinese.



**Girder Bridge on Concrete Abutments.**

Our introduction to the Chekiang section of the railway came a few days sooner than was expected, however, and under circumstances which gave us a much fairer opportunity of judging the line than would have been possible by the night trip in the special alone. Contrary tides and the inability of the launches to keep up to schedule with their heavy trains of house-boats brought us to Kashing, the half-way point between Shanghai and Hangchow, so far behind time that it was found necessary, in order to meet our luncheon engagement at Hangchow, to abandon the boats and take the morning train on its way through from Shanghai.

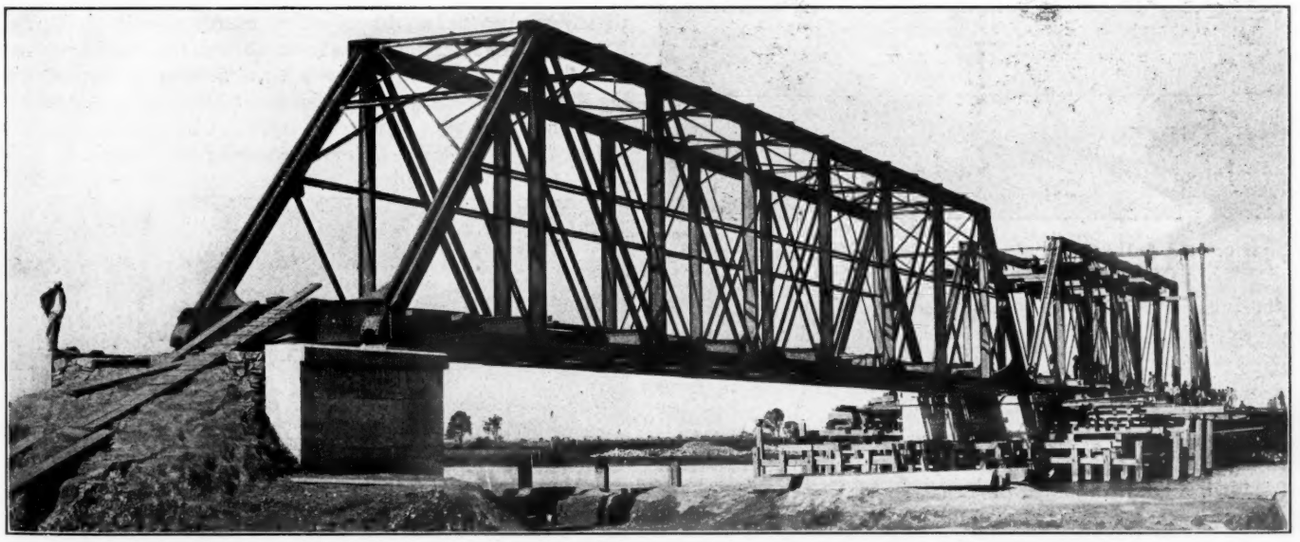
Shanghai Terminal; Kiangsu-Chekiang Railway.

The commodious and substantial brick station has large and comfortable, first, second and third class waiting rooms, and is finished throughout, plainly but attractively, in teak. There are gates for regulating the movement of passengers, and a viaduct for crossing to and from the main platform in leaving and taking the down trains which came in on the farther siding. The platform is strongly built of well tamped macadam in brick retaining walls, and extends for some distance beyond either end of the station.

The track is heavily but rather loosely ballasted. The ties are Japanese hardwood, and all of those which we saw, not only at Kashing, but at a number of other stations as well, appeared of fair quality and in good condition. They are 6 in. x 8 in. x 8 ft. long, and spaced 2 ft. 4 in. between centers. They cost fifty cents gold apiece, delivered, and are expected to have a life of from six to eight years.

The limestone and sandstone ballast did not appear—and is not, in fact—of the quality of the granite that was used in the Shanghai-Nanking roadbed. It was brought from a quarry situated at the end of a spur near Hangchow, and was furnished at the very reasonable cost of 25 cents per cubic yard. It was laid 10 ft. wide and 6 in. deep.

Seventy-five pound rails were used. They were 33 ft. long, of standard section, and were laid with even joints. They bore the marks of the Hanyang Iron Works, the greatest manufacturing concern of China. I may say, in this connection, that it is only a matter of a few years before China will make all of her own rails, as well as all the other more simple iron and steel products.



Bridge Over Taoling River.

The nine or ten-car Shanghai-Nanking train came into Kashing behind its American Locomotive Company locomotive, and three or four of us found ourselves in a bright, well-finished American-made car, where we rode in comfort for two hours and a half before discovering that we were in the second-class section of the train. This car, in fact, with its easy cane seats, Pintsch lights, large luggage racks and commodious and well-appointed lavatories, was more comfortable than many of the so-called first-

class cars in which I have ridden in western America. The seats were arranged facing each other in twos, and when tea or refreshments were ordered a folding table was swung up between them from the wall where it had been hanging. This we found a common arrangement on many of the Chinese roads, where the traveling public is much given to lunching and tea drinking through all hours of the day and night.

Many of the cars of the Kiangsu part of the line have a stork-like appearance caused by the fitting of American built bodies and trucks upon the large Chinese standard wheels. The cars and trucks were ordered from America, as were also the engines. The latter from the American Locomotive Company, were ordered to meet the requirements of the Chinese Railway Board's rule that the height from the top of the rail to the center of the draw-bar or coupling should be 3 ft. 7 in. The cars were ordered to be built according to American practice, which stipulate a height of 2 ft. 9 in. To the American car and the American truck has been fitted the standard Chinese wheel, 3 ft. 6 in. in diameter, or 9 in. more than the American standard. To give clearance to this

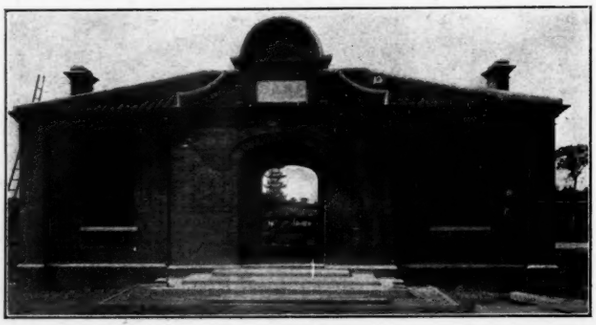
**Interior of Third-Class Coach; Kiangsu-Chekiang Railway.**

wheel the car bodies have been blocked up at the kingbolt and on the sides about 9 in. The result is neither graceful nor conducive to stability.

Our journey down to Hangchow, and our later return from there in the really luxurious special which the directors of the two roads put at our disposal, gave us little opportunity for investigating any of the multifarious defects which our foreign friends in Shanghai harped on so continuously. On the score of comfort, even on the train which we boarded without warning at the wayside station, there was nothing to be desired. In fact, the only disagreeable feature noted was the very considerable jar and rattle while the train was in motion, which made sustained conversation almost impossible. This trouble is doubtless due partly to the patched up cars, as well as to the roadbed.

Neither on the trip from Kashing to Hangchow, nor from Hangchow back to Shanghai, nor in three or four short side trips about Hangchow, was there an accident of any kind, nor the least hitch in the by no means simple arrangements for handling so large a party. Quite naturally, considering what we had been led to believe would happend to us if we traveled over these lines, the Commercial commission was agreeably surprised in the Kiangsu-Chekiang Railways. For my own part, the favorable opinion formed at that time has not materially been altered by a couple of recent trips which I have made over the roads at my leisure.

An interesting fact in connection with the Chekiang Railway, which operates the 78 miles of line from Fengching to Hangchow, and is building the important extension from the latter point to Ningpo, is the large number of stockholders it has. Only Chinese were permitted to subscribe for stock, and the capital of $10,000,000 is divided between 53,000 different individuals. Forty-thousand of these are coolies, tradesmen and small farmers, and

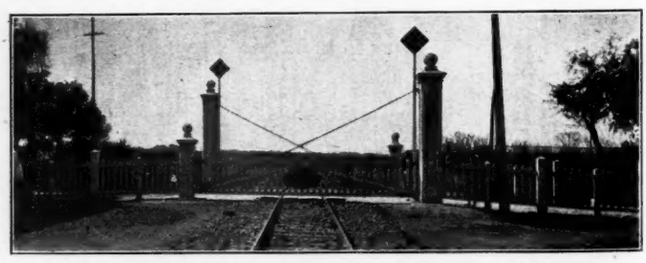


**Third-Class Waiting Room, Built of Brick, Concrete and Tile.**

it is said that subscriptions for as low an amount as $5 were accepted.

The economy with which this line is run may be judged from the fact that the president and vice-president receive no salaries, and that the chief engineer, a graduate of the University of California and a perfectly competent man, gets $2,750 a year. Locomotive enginemen receive from $28 to $37 per month; station masters, $8.50 to $16; track foremen, $4.50, and coolie section hands, 15 cents a day. If graft were cut down at all it would readily be seen not only that this road could have been built inside of the figure which the Chinese claim—$20,000 per mile—but that its operating expenses must also be about as low as those of any road in the world. On the recently completed Sunning Railway in Kwantung province, near Canton, the salaries average even lower than these, the president and general manager receiving $38 a month; locomotive enginemen, $20; firemen, $8, and section hands 13 cents a day.

The Chekiang Railway, from Fengching to Hangchow, is 78



**Gates at Grade Crossing.**

miles long on the main line, with about half that length of sidings. There are a total of 144 steel girder bridges, supported on concrete abutments, and 157 culverts. All of the girders were purchased from the American Bridge Company of New York. The longest bridge on the road is a 60-ft. span. The average span of all bridges is 45 ft.

I find this comment on the method of bridging many of the waterways where there was difficulty in finding good foundation, or where regular practice would have been inconvenient: "The country traversed by the Chekiang and Kiangsu Railways is a network of canals and creeks, the natural highways of commerce and trade in this low-lying section. The closing or narrowing of those

streams by cofferdam to the detriment of the great junk and river traffic was prohibited by the authorities, so in many instances the railway engineer put into practice the old scheme of building one abutment at the water's edge, the other on dry land to one side, and, after completion, diverting the shallow canal from its old channel to its new one between the abutments. There is nothing remarkable about this practice, though a London paper has used it as an argument to criticize the professional ability and capacity of the engineers. . . . The mere fact that such a practice could be resorted to is an indication of the harmlessness and sluggishness of the water, and as nearly all are tidal canals it rather reflects on the good judgment of the engineer than otherwise, as the best method of keeping the narrow channels open to junk traffic during the construction of the road."

The Chekiang Railway has 15 stations, and the Kiangsu line 10. All of the station buildings on both lines are of brick, of which the one I described at Kashing is a fair type.

The Kiangsu line has 48 bridges, exclusive of culverts, some being stone arches and some steel girders. The longest is over the Zia Tang. It is 440 ft. long, in two spans, and has proved the most expensive undertaking in the construction of the road. Three other bridges, 400, 300 and 100 ft. long, respectively, were constructed cheaply and quickly.

Nearly all the rolling stock on the Kiangsu line is American, and except for the appearance of the American car bodies on Chinese wheels, it is a very creditable assortment. The Chekiang road has been aptly described as a menagerie of rolling stock, no less than a dozen different types being in service on the 78 miles of line. Several factories of the United States, Germany and England are represented, with the result that some of the yards have the appearance of an international exhibition of railway equipment. The company stoutly maintains that it knows exactly what it is doing, and that the motley array was bought with the idea of experimenting with everything the market afforded and with the idea of determining for itself which was best. This is possibly true, but it gives one the impression of being rather a wild piece of extravagance for a road which in other respects has made such a strong showing on the score of economy.

To the charge that the Chinese are sacrificing quality for economy in the construction of those roads which they are building independently of foreign direction, George Bronson Rea, in a last year's number of his *Far Eastern Review,* makes the following convincing reply:

"In the building of such roads as the Peking-Kalgan, the Kiangsu, the Chekiang and the Sunning, under purely native supervision and control, China has demonstrated to the world that she is fully competent to develop her transportation facilities at figures defying foreign competition. At a cost of $20,000 to $30,000 per mile there is very little scope for dishonesty. The roads may not be up to accepted foreign standards, but there are many new roads throughout the world of which the same may be said; and if China is satisfied and willing to construct a cheap road at first, and improve it as receipts increase, she will only be following a precedent set by successful pioneer railway builders in all countries."

## RAIL PRODUCTION IN 1912.

Statistical Bulletin No. 2, of the Bureau of Statistics of the American Iron and Steel Institute, Philadelphia, Pa., shows that the production of all kinds of rails in the United States in 1912 amounted to 3,327,915 tons, against 2,822,790 tons in 1911, an increase of 505,125 tons, or over 17.8 per cent. Included in the total for 1912 are 174,004 tons of girder and high T steel rails for electric and street railways, as compared with an output of 205,409 tons of similar rails in 1911.

Of the total production of rails in 1912 3,165,939 tons were rolled from Bessemer, open-hearth, and electric steel blooms or billets; 42,586 tons were rolled from new seconds, defective new rails, and steel crop ends; and 119,390 tons were rerolled from old steel rails or were renewed steel rails. No iron rails are reported for 1912.

The production of Bessemer rails in 1912 amounted to 1,099,926 tons, against 1,053,420 tons in 1911, an increase of 46,506 tons. Of the total in 1912 1,070,480 tons were rolled from ingots and 29,446 tons were rolled from new seconds, defective new rails, crop ends, etc. The maximum production of Bessemer rails was reached in 1906, when 3,791,459 tons were produced.

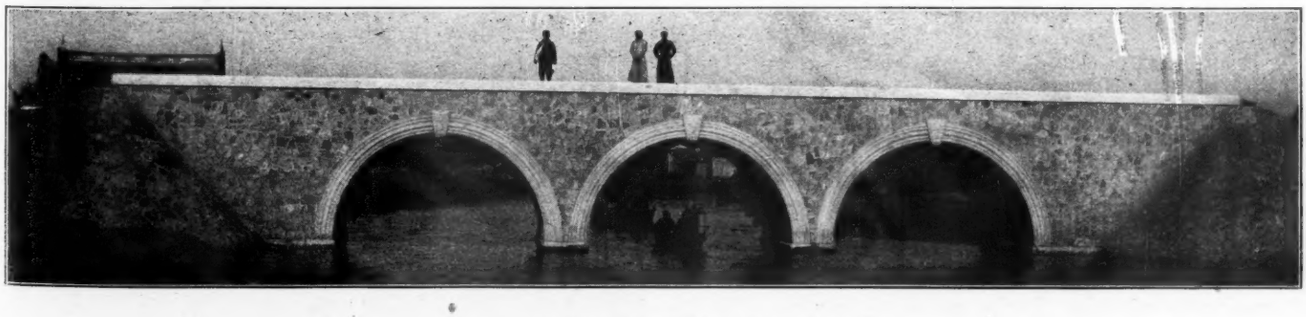
The production of open-hearth rails in 1912 amounted to 2,105,144 tons, against 1,676,923 tons in 1911, an increase of 428,221 tons, or over 25.5 per cent. Of the total in 1912 2,092,004 tons were rolled from ingots and 13,140 tons were rolled from new seconds, defective new rails, crop ends, etc. Almost all were rolled from basic steel. The maximum production was reached in 1912. It will be noticed that the production of open-hearth rails in 1912 was almost twice that of Bessemer rails in the same year.

In 1912 the production of rails rolled from steel made in electric furnaces amounted to 3,455 tons, as compared with 462 tons in 1911. In 1909 and 1910 small quantities of rails were also rolled from electric steel, but these rails were included with the Bessemer and open-hearth rails reported for these years.

In 1912 the production of steel rails rolled from new seconds, defective new rails, crop ends, old steel rails, etc., including renewed rails, amounted to 161,976 tons, of which 42,586 tons were rolled from new seconds, etc., and 119,390 tons were renewed rails or were rerolled from old steel rails. Of the 42,586 tons rolled from new seconds, etc., 29,446 tons were rolled from Bessemer steel and 13,140 tons were rolled from open-hearth steel, and are therefore included in the totals given for Bessemer and open-hearth rails for that year. But, as the 119,390 tons of rails rolled from old steel rails in 1912, and the renewed rails as well, could not be classified by the manufacturers they are not included in the Bessemer or open-hearth rail output for that year, but are grouped under the general heading of electric and rerolled steel rails. Prior to 1911 all rails of this class are included with Bessemer or open-hearth steel rails.

No iron rails were rolled in 1912. In 1911 the production was 234 tons, all rolled in Illinois, and all weighing less than 45 pounds to the yard, against 230 tons in 1910.

The table on the following page gives the production of all kinds of rails in 1912, classified according to their weight per yard, and totals according to weight since 1902.



**Stone and Concrete Bridge Over Canal.**

| Kind of rails—Gross tons. | Under 45 lbs. | 45 lbs. and less than 85. | 85 lbs. and over. | Total. Gross tons. |
|---|---|---|---|---|
| Open-hearth steel rails | 75,203 | 488,695 | 1,541,246 | 2,105,144 |
| Bessemer steel rails | 103,826 | 591,744 | 404,356 | 1,099,926 |
| Electric and other steel rails | 69,643 | 38,153 | 15,049 | 122,845 |
| Iron rails | None | None | None | None |
| Total for 1912 | 248,672 | 1,118,592 | 1,960,651 | 3,327,915 |
| Years—Gross tons. | | | | |
| Total for 1911 | 218,758 | 1,067,696 | 1,536,336 | 2,822,790 |
| Total for 1910 | 260,709 | 1,275,339 | 2,099,983 | 3,636,031 |
| Total for 1909 | 255,726 | 1,024,856 | 1,743,263 | 3,023,845 |
| Total for 1908 | 183,869 | 687,632 | 1,049,514 | 1,921,015 |
| Total for 1907 | 295,838 | 1,569,985 | 1,767,831 | 3,633,654 |
| Total for 1906 | 284,612 | 1,749,650 | 1,943,625 | 3,977,887 |
| Total for 1905 | 228,252 | 1,601,624 | 1,546,053 | 3,375,929 |
| Total for 1904 | 291,883 | 1,320,677 | 672,151 | 2,284,711 |
| Total for 1903 | 221,262 | 1,603,088 | 1,168,127 | 2,992,477 |

The production in 1912 of rails weighing under 45 pounds to the yard shows an increase of 29,914 tons as compared with 1911; rails weighing 45 pounds and less than 85 pounds show an increase of 50,896 tons; and rails weighing 85 pounds and over show an increase of 424,315 tons. In 1912 over 41 per cent. of the rails weighing less than 45 pounds to the yard, nearly 53 per cent. of the rails weighing 45 pounds and less than 85 pounds, and over 20 per cent. of the rails weighing over 85 pounds were rolled from Bessemer steel, while in the same year over 30 per cent. of the rails weighing less than 45 pounds per yard, over 43 per cent. of the rails weighing 45 pounds and less than 85 pounds, and over 78 per cent. of the rails weighing 85 pounds and over were rolled from open-hearth steel.

In the following table the production of all kinds of rails from 1903 to 1912 is given by processes. Of the total production of rails in 1912 about 33.05 per cent. were rolled from Bessemer steel, about 63.25 per cent. were rolled from acid and basic open-hearth steel and about 3.70 per cent. were rolled from electric steel and from old steel rails. As previously stated no iron rails were rolled in 1912.

| Years—Gross tons. | Bessemer. | Open-hearth. | *Iron and all other. | Total. |
|---|---|---|---|---|
| 1912 | 1,099,926 | 2,105,144 | †122,845 | 3,327,915 |
| 1911 | 1,053,420 | 1,676,923 | †92,447 | 2,822,790 |
| 1910 | 1,884,442 | 1,751,359 | 230 | 3,636,031 |
| 1909 | 1,767,171 | 1,256,674 | ... | 3,023,845 |
| 1908 | 1,349,153 | 571,791 | 71 | 1,921,015 |
| 1907 | 3,380,025 | 252,704 | 925 | 3,633,654 |
| 1906 | 3,791,459 | 186,413 | 15 | 3,977,887 |
| 1905 | 3,192,347 | 183,264 | 318 | 3,375,929 |
| 1904 | 2,137,957 | 145,883 | 871 | 2,284,711 |
| 1903 | 2,946,756 | 45,054 | 667 | 2,992,477 |

*Iron rails only from 1903 to 1910 inclusive.

†Include 234 tons of iron rails in 1911 but none in 1912; also 462 tons in 1911 and 3,455 tons in 1912 of rails rolled from electric steel; also 91,751 tons in 1911 and 119,390 tons in 1912 of renewed rails or rails rerolled from old steel rails which the manufacturers could not classify as Bessemer or open-hearth steel rails.

Included in the 3,327,915 tons of steel rails rolled in 1912 are 149,267 tons of alloy rails, against 153,989 tons in 1911. The following table gives the production of titanium, manganese, and other alloy steel rails by processes from 1909 to 1912.

| Alloy rails—Gross tons. | Bessemer. | Open-hearth and electric. | Total. |
|---|---|---|---|
| Titanium steel rails | 103,941 | 37,832 | 141,773 |
| Manganese, copper, and nickel | 4,933 | 2,561 | 7,494 |
| Total for 1912 | 108,874 | 40,393 | 149,267 |
| Total for 1911 | 115,450 | 38,539 | 153,989 |
| Total for 1910 | 229,935 | 27,389 | 257,324 |
| Total for 1909 | 35,699 | 13,696 | 49,395 |

In the following table the production of titanium, manganese, and other alloy steel rails is given by kinds since 1909.

| Alloy rails—Gross tons. | 1909. | 1910. | 1911. | 1912. |
|---|---|---|---|---|
| Titanium steel rails | 35,945 | 256,759 | 152,990 | 141,773 |
| Manganese, copper, nickel, etc. | 13,450 | 565 | 999 | 7,494 |
| Total | 49,395 | 257,324 | 153,989 | 149,267 |

In addition to the rails rolled in 1912 we imported 3,780 tons of iron and steel rails. During the same year we exported 446,473 tons of steel rails. In 1911 our exports of rails, all steel, amounted to 420,874 tons and our imports to 3,414 tons.

## NEW VIEWS CONCERNING RAILWAY COMMISSIONS.

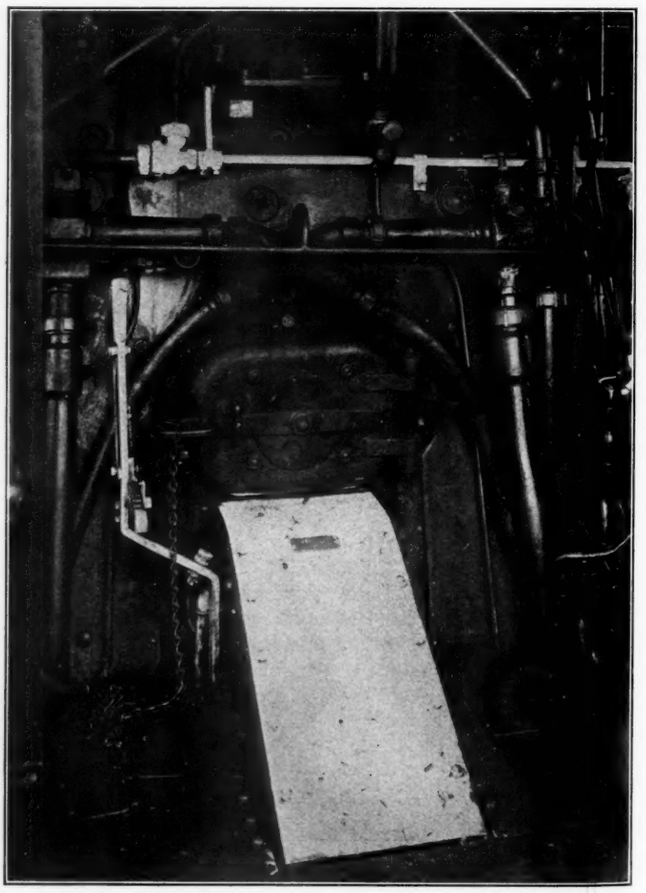
For the last twenty years the public has intrusted its interests to state railway commissioners whose only claim to their positions is their ability to cozen the voters into electing them; their principal asset, political ability; their experience, legal "hair-splitting," combined with an egotism begotten of elevation from a sphere where the question was where tomorrow's bread and butter was coming from, to an office where the earning power of hundreds of millions of dollars was affected by their actions. From a position of little or no importance to one where they assumed to dictate to leaders in the world of transportation and of finance. . . The *St. Louis Republic* announces the failures of efforts to regulate railways by commissioners, and states that there exists a demand for a change. The "Public Utilities" bill now before the Missouri legislature says:

"The people of Missouri have had exactly the same experience with elected railroad commissioners that every other state that has tried them has had. It is because this method of railroad regulation has been a practical failure the country over that the states are turning to expert commissions, chosen by executive appointment. The present plan of railway control has so worked in Missouri that there is general demand for an appointive commission to take up railway regulation."—*Railway Record.*

## THE GEE LOCOMOTIVE STOKER.

The stoker shown in the illustrations has been developed and patented by N. E. Gee of the mechanical engineer's office of the Pennsylvania at Altoona, Pa. It is of the over-feed type, using steam jets for distributing the coal over the grate.

Four main parts are embodied in this stoker—the source of power, the coal crusher, the coal conveyor and the coal dis-

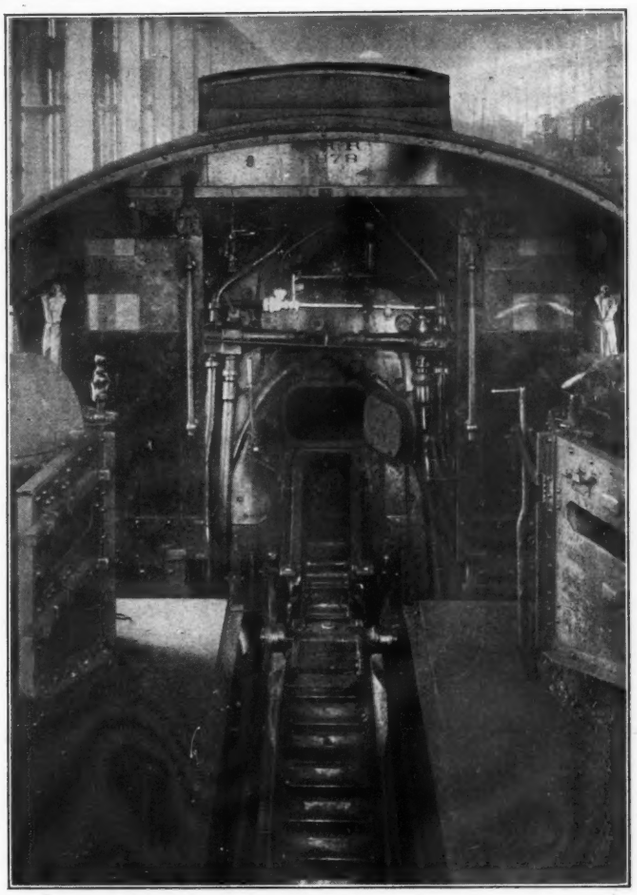


View of the Stoker Showing the Fireman's Control Lever.

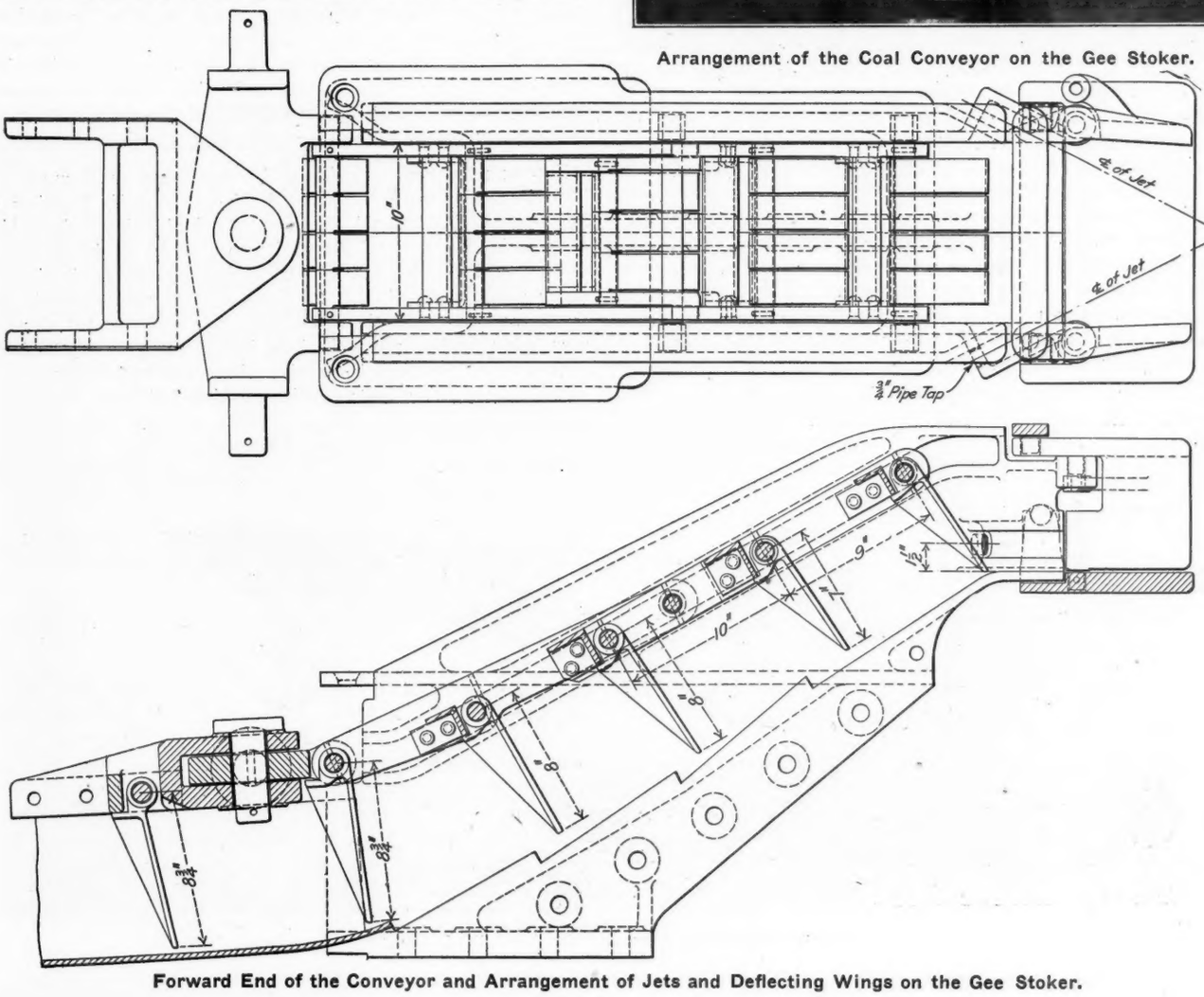
tributer. The first three are of the same general style as those used on the Crawford stoker. The source of power is a cylinder 18 in. in diameter x 11½ in. stroke, secured to the locomotive frame below the cab, which transmits reciprocating motion through a jack shaft to the coal crusher and the conveyor. The crusher is located beneath the rear end of the coal pocket in the tender and the conveyor is in a trough below the tender floor and transfers the coal from the crusher to the distributer. It is horizontal to the end of the tender and is then inclined upward, terminating at an opening in the back head of the boiler just below the fire door. This opening is the lower part of an enlarged fire door opening of the ordinary construction. The conveyor is of the reciprocating type with swinging fingers and the trough of the inclined section is of cast steel, the bottom having notches or steps which prevent the coal sliding backward.

The coal distributer is simple in its arrangement and consists of a flat cast iron plate or apron extending inside the firebox, two vertical, cast iron wings, one on either side, which are hinged at the rear, and two stationary steam jets which discharge from a point just back of the wings, diagonally across the apron. The angle of discharge is such that the centers of the two jets meet at a point a few inches in front of the center of the plate. The two wings are connected by a cross bar, giving them simultaneous movement, and are operated by a connection to the fireman's control lever.

The steam jets are intermittent in their action, and are open only at the extreme forward end of the stroke of the conveyor. This is accomplished by means of a nozzle control valve which embodies two separate and independent piston valves, one regulating the amount of the steam discharge through either of the two jets, and the other the intermittent action of the blast. The latter is operated through a yoke connected to the conveyor driv-



Arrangement of the Coal Conveyor on the Gee Stoker.




Forward End of the Conveyor and Arrangement of Jets and Deflecting Wings on the Gee Stoker.

ing arm and consists of a differential piston held in a closed position by the steam pressure, except as it is opened by the yoke. The other valve is connected to the fireman's control lever and reduces or entirely closes the passage to one or the other of the nozzles as desired. When the control lever is in the center, the deflecting wings stand parallel to the sides of the conveyor and steam is admitted to both of the jets. In this position the coal is distributed evenly across the grate except in the back corners. When the control lever is pulled to its extreme backward position the deflecting wings are swung to the left and the left jet is shut off while the one on the right is wide open. In this position the coal is discharged to the left back corner of the firebox. When the control lever is thrown forward it supplies the right back corner. Intermediate positions between these extremes will place the coal at any desired location on the grate.

The stoker occupies but little room in the engine cab and in no way interferes with hand firing. The apron and the distributing wings are so arranged that they may be easily removed from the outside of the firebox and can be replaced with spare parts if necessary. These are the only parts of the apparatus that are exposed to the action of the fire. It is claimed that it is possible to fire any kind of coal with this device at any rate up to 18,000 lbs. an hour and that it readily operates with 40 lbs. steam pressure. The stoker has successfully fired a large locomotive for over fifty trips.

## LARGE CAPACITY WRECKING CRANE.

Two wrecking cranes of greater capacity than any heretofore made have recently been built for the Norfolk & Western by the Industrial Works, Bay City, Mich. They were designed to meet the needs of the modern heavy equipment which has developed so rapidly during the past few years. It is only a short time since the 100-ton cranes were standard, and these were soon followed by the 120-ton cranes, which were then adequate for almost any class of work. These new cranes have a capacity of 150 tons at 17 ft. radius and almost any obstruction to traffic may be easily handled by them. They are also valuable in other work where heavy loads are to be handled, such as in modern construction work, bridge replacements, etc.

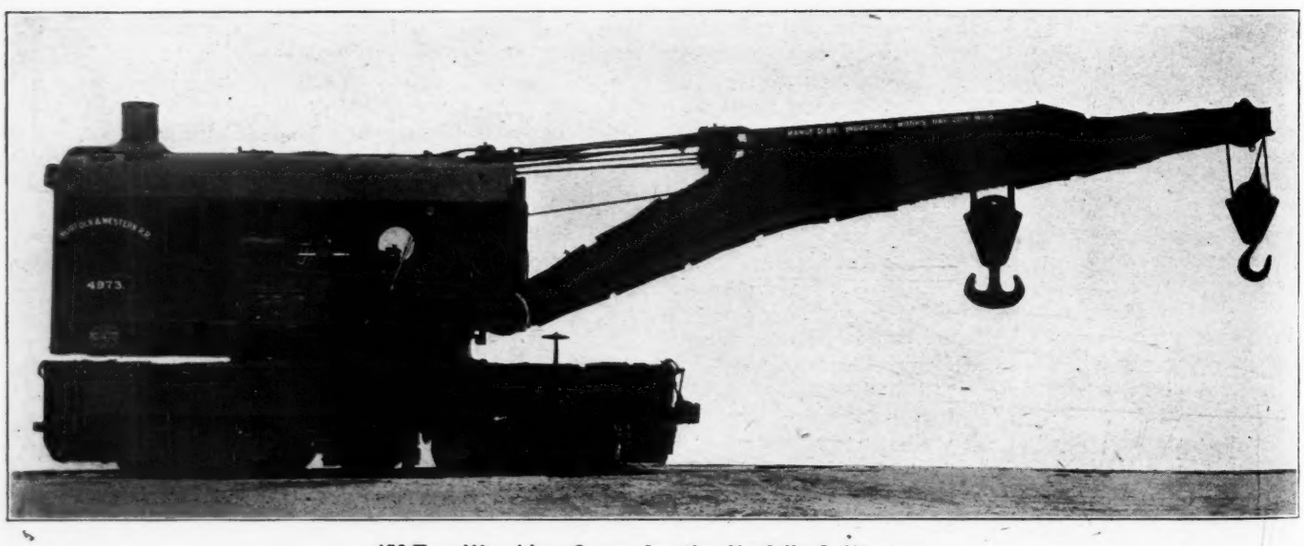
Each crane is provided with a system of telescope outriggers so that a load that would be too great a strain on the track may be distributed over a large area of the road bed. Where extreme loads are to be handled, or where the ground close to the track is not firm enough to give sufficient foundation, a special outrigger is used. This is 10 ft. long and is located in the center of the car body. It may be extended over to one side or the other about 7 ft. beyond the side of the car.

The framework of the car is 27 ft. long by 10 ft. wide, and is constructed entirely of steel and cast iron, with heavy end and longitudinal sills, all strongly reinforced and tied together. Two four wheel trucks with steel wheels are provided, with hubs of special weight to suit the large axles used. Complete air brakes, with engineer's valves, etc., are connected to each truck, and in addition a hand brake is connected to one truck. The draft rigging, attached to both ends of the car, is of extra heavy weight and the automatic couplers are of the standard type. The weight of the crane, in working condition, is about 143 tons, which weight is distributed over a wheel base of approximately 20 ft. All of the M. C. B. requirements are included in its construction. The load of the crane is distributed to the heavy cast steel bed plate through a system of rollers which operate on a path turned on the bed plate. The rollers are made of cast steel, and are arranged with equalizers to provide an equal bearing on the base plate. In addition to the equalizers a simple form of adjustment is provided for each roller.

A noteworthy feature in the operation of the crane is the air control for some of the movements. The main hoist, auxiliary hoist, boom hoist and slewing are all operated by means of air clutches controlled by valves, which gives an easy and quick means of control. The main and auxiliary hoist brakes are of the screw types and are operated by a hand wheel. They will hold the maximum loads in any position, or will lower them at a slow rate of speed. The operator's platform is so placed that the handles of the operating levers are readily accessible, and so that the operator may have a clear view of the work.

The boiler is of the vertical type, being designed for 150-lbs. pressure, supplying steam to two engines located on each side of the crane. All of the principal bearings are accessible for inspection. The crane will hoist its maximum load at the rate of 10 to 15 ft. per minute, and the boom may be raised or lowered while handling this maximum load. The operations of hoisting with either the main or auxiliary block, raising or lowering the boom and slewing may be performed independently and simultaneously with loads up to the capacity of the engines.

Electrification on the North Eastern Railway, England.—The North Eastern Railway has decided to electrify its mineral line between Shildon and Newport, near Middlesborough. This distance is 18 miles, and the total length of the track, including sidings, will be about 50 miles. A great amount of mineral traffic passes from Shildon to Newport, the average weight of the trains being more than 900 tons. It is said that ten electric freight locomotives are to be built by the company at Darlington; each of them will be capable of starting and hauling at a speed of 25 miles an hour a train weighing 1,400 tons.



150-Ton Wrecking Crane for the Norfolk & Western.

# Maintenance of Way Section.

ONE point emphasized in several of the contest papers published in this issue is the advisability of preparing for the winter during the entire preceding season. In other words, the time to begin to prepare for next winter is when the frost leaves the ground this spring rather than to wait until next October or November when labor forces will have been reduced and many odds and ends will remain to be cleaned up.

THE standard practice regarding the construction of station platforms varies widely. The actual practice regarding the maintenance of these platforms varies even more widely. With his intimate knowledge of their relative importance from the standpoint of safety, the average supervisor of structures is inclined to slight the platforms in favor of the bridges or larger buildings. However, aside from the question of personal injuries and claims, defects in the station platform are much more evident to the average person and will give rise to much more complaint than those on a bridge or more complicated structure, which most people know nothing about. On the other hand, well kept buildings and platforms will compensate for many other faults in the eyes of the traveling public, and will be reflected in more general good will towards the company.

NINE papers were received in the contest on "Winter Maintenance Methods." These papers were submitted to E. S. Koller, assistant general manager, Chicago, Burlington & Quincy, H. G. Clark, assistant to the vice-president, Chicago, Rock Island & Pacific, and H. H. Decker, engineer of maintenance, Chicago & North Western. The paper by A. M. Clough, supervisor, New York Central & Hudson River, Batavia, N. Y., was awarded first prize, and that by S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md., second prize. Other papers were submitted by F. M. Patterson, assistant engineer, Chicago, Burlington & Quincy, Chicago; F. W. Fuller, roadmaster, Northern Pacific, Dilworth, Minn.; L. C. Lawton, division engineer, Atchison, Topeka & Santa Fe, Newton, Kan.; J. H. Markley, master bridges and buildings, Toledo, Peoria & Western, Peoria, Ill.; A. S. Markley, master carpenter, Chicago & Eastern Illinois, Danville, Ill.; F. A. Kell, roadmaster, Missouri Pacific, St. Louis, Mo., and Joseph J. Morgan, New York Central & Hudson River, Kingston, N. Y., all of which are published in this issue.

NEARLY two years ago we conducted a contest entitled, "How the Roadmaster Can Promote Efficiency." Since then we have received several requests for a similar contest covering the bridge, building and water service departments. We have, therefore, selected as the subject of the next contest, "Efficient Methods in the Bridge, Building and Water Service Departments." On many roads these three departments are combined. Contributions describing the organization, distribution and management of the different regular and extra gangs, special methods or kinks in the construction or repair of any structures, and in fact, all ideas tending to promote efficiency in these departments, will be acceptable. In addition to the ordinary bridge structures, this contest will include the maintenance of water tanks, pumping plants, coal chutes and other yard buildings; station buildings and platforms, and any other structures ordinarily coming under the supervision of this department. The judges will give special consideration to statements and data regarding the actual results secured by the improvement described, so that all information of this nature should be included. We will pay $25 and $15 for the best and second best papers received, and will pay for all other contributions accepted and published at our space rates. All contributions should be sent to the Civil Engineering Editor, *Railway Age Gazette*, Transportation Bldg., Chicago, and must be received before April 25.

THE adaptability of steam for melting snow and ice around switches, track pans, turntables, etc., is brought out in a number of articles on various phases of winter maintenance in this issue. The clearing of tracks by melting the snow and ice is more satisfactory than by sweeping or picking them out, although direct radiation from steam pipes is only one of the methods in use for melting them. The local conditions must, of course, be the deciding factor in the choice of methods. The use of steam for this purpose is naturally particularly applicable at points where boilers are already in use in regular service, as at track pans, turntables or yard switches, located near pumping plants or terminal powerhouses. This method may also be used to advantage when old portable boilers are available. In many cases the boilers used for hoists or concrete mixing plants during the summer, are idle all winter and could as well be used for this purpose. The installation of steam pipes for keeping switches clean is not necessarily difficult or expensive for the installation can be of a temporary character, with the pipes taken out and stored during the summer. As it is usually customary to skeleton the track at switches during the winter to secure free drainage, the only cost chargeable to the installation of the steam pipes is the labor necessary to lay and connect them. As the pipe is laid with coils or bends between the ties, there is no difficulty with expansion and contraction, and condensation can easily be handled by inserting a drip cock at the low point in the line. Installations of steam pipes at track pans and turntables may well be of more permanent character, carefully located to secure the best results and provided with steam traps to care for the condensation. In addition to the uses mentioned above, steam can frequently be used to good advantage in ordinary maintenance work in keeping concrete aggregate ready for use and maintaining sufficient heat in new concrete until it can set. The suggestion in one of the articles in this issue that coal cars and cinder cars be equipped with steam pipes for facilitating the unloading of materials from these cars in cold weather, is also worthy of consideration.

THE amount of attention now being paid to screw spikes and other details of more permanent track construction emphasizes the temporary nature of our present standard construction. The distinction between temporary and permanent railway structures is, however, only relative. We commonly call a timber bridge with a life of eight or ten years a temporary structure as compared with one of steel or concrete. On the other hand, our so-called permanent track construction has a life even shorter than that of a timber bridge, for the average life of rail and untreated ties which are still largely in the majority may be safely assumed to be seven years. As the ballast will need replenishing at least this often, it may be said that the entire track structure must be replaced every seven or eight years.

The report of the Interstate Commerce Commission for the year ended June 30, 1911, gives the cost of maintenance of way and structures as $1,550 per mile of line, or $1,040 per mile of track, including all tracks. The amounts expended for main tracks exclusive of side tracks would probably therefore be about $1,350 to $1,400 per mile. While not all of this was expended on the track, this report indicates that at least three-fourths of it, or $1,000 per mile, was. This is an annual charge for maintenance in excess of 10 per cent. of the original cost of the average track structure above the sub-grade. Such construction, requiring such a high expenditure for maintenance, cannot be accurately termed permanent. Analysis of the expenditure for

maintenance of way and structures for the year ended June 30, 1910, which is the last year for which the complete statistics of the Interstate Commerce Commission are available, shows that 20.093 per cent. of the total operating expenses fell in this subdivision. With the exception of labor, the largest single item is that for ties, which is 3.099 per cent. of the total operating expense, or over one-sixth of the entire expenditure for maintenance of way and structures. This amount is three times that spent for rails and considerably greater than that spent for ballast, rail and all other track material combined.

It is evident, therefore, that one of the greatest fields for a study of possible economies lies in the tie, because of its great influence upon the total result. Screw spike construction is one result of this study; the steel tie is another. As with almost any new form of construction designed to decrease the annual charges, the first cost of installation is increased. This was so with the treated tie and is so with the screw spike. This, in itself is sometimes, although perhaps less frequently than formerly, the stumbling block in the way of the adoption of new types of construction. While our present track construction is the result of more than a half century of development, we are far behind European practice in our adoption of permanent construction notwithstanding the fact that the service demanded there is less severe than in this country. It would seem that the expenditures for the maintenance of our track are out of proportion to the maintenance of other structures and that, with the constantly increasing service demanded of the track, a more permanent construction is fast becoming necessary.

## COMPANY VERSUS CONTRACT CONSTRUCTION WORK.

At this time, when the construction and betterment work to be done this year has been largely decided on and plans are being prepared for its prosecution, it is well to consider the relative advantages of doing this work by contract or by company forces. This subject has been the theme of controversy for years, and there is much to be said on both sides. While the decision as to each piece of work should depend largely on local conditions, including the nature of what is to be done and the experience and character of the organization of the particular road, most of it is handled in accordance with some well defined policy of the individual railway.

The subject at once divides itself into two quite different problems—the construction of new lines, and the betterment of existing lines. The practice on most roads in new construction varies only in respect of the extent to which the work is done by contract. Some roads contract all parts of new construction from the clearing of the right of way to track laying and ballasting, and take over the line when it is ready to operate. But this is not the general practice. While the grading is usually contracted, most roads lay their own track and ballast it. Most roads also erect their own steel bridges, while many also do all their own concrete work, as the Chicago, Milwaukee & St. Paul is doing on a portion of its new line between Great Falls, Mont., and Lewistown, where about 400 men are now employed. The advantages of contract work are greatest on new extensions, in the building of which a large amount of equipment is required. The contractor is frequently justified in securing more elaborate equipment and developing a more complete organization than an individual railway, because he can count on being able to use them on different railways year after year.

With maintenance and betterment work, however, the conditions are different, and with the rapidly increasing ratio which the expenditures for this work bear to the total expenditures for improvements and construction, the tendency of the roads to do more and more of these classes of work with their own forces is becoming increasingly important. A number of large roads maintain strong organizations to do practically everything of this nature, others are securing new equipment and doing an increasing amount each year, and practically all have sufficient facilities to load ballast and do many small pieces of work which it is not practicable to contract for. The Burlington has long followed the policy of doing its own betterment work and now operates about 15 steam shovels and two large suction dredges on the lines east of the Missouri river alone, while additional steam shovels and another dredge are now being built. While perhaps few other roads have gone so far in this direction, several operate 8 or 10 steam shovels each in ballast pits and on the smaller improvement work. The Atchison, Topeka & Santa Fe requires 20 steam shovels with the necessary auxiliary equipment for this miscellaneous work alone, without attempting to do any of the heavier work. One large road has just placed an order for five steam shovels for this spring's delivery.

Two conditions not present in the construction of new lines greatly favor the handling of betterment work by company forces. One of these is the very frequent necessity of interfering to a certain extent with the operation of trains and of maintaining structures in safe condition for their passage. The other is the practical continuity of betterments from year to year. The first is the most important consideration. When improvements are being made alongside existing tracks a certain amount of interference with the main tracks and with the operation of trains may be necessary. To insure the protection of trains it then becomes requisite for the railway to have someone in charge who is thoroughly familiar with train movements and whom the company can hold directly responsible. If the work is done by contract this requires the placing of a company representative on the ground whose authority must be supreme whenever train movements are concerned, frequently leading to more or less friction with the contractor. Where more or less delay because of traffic is to be expected, the contractors are likely to base their bids on the maximum delay which may be expected, while company forces can take the delays as they come, light traffic tending to reduce the cost of the work.

With bridge work under the main tracks absolute safety of the structures at all times is essential, and several roads that are willing to contract grading along the main tracks do all of their own bridge work. The Chicago, Milwaukee & St. Paul has at the present time 2,300 men employed on work of this nature on the lines east of the Missouri river, while the Burlington has 21 concrete gangs on one division alone. Both of these roads do all bridge work along existing lines, and much on extensions, with company forces. A number of other large railways do likewise, while others, such as the Illinois Central and Lake Shore, do a large and increasing proportion of this work in the same way.

The practical continuity of betterment work from year to year, has enabled the railways to build up organizations for it. In past years the first cost of construction equipment has often prevented the adoption of a policy of handling betterments with company forces, but this obstacle is rapidly being overcome as the advantages of this practice are more generally realized, and several roads are this spring buying more of the kind of equipment mentioned than ever before. The demands upon the railways for additional facilities require a large amount of work to be done each year, and because of this pressure improvements are not subject to the variations that the building of extensions is. With construction equipment directly under its control, a railway company can adapt its program for the year more closely to the traffic conditions than would be possible with a number of individual contracts.

Besides enabling a railway to arrange a more flexible program for its season's work, the possession of this equipment is an advantage in emergencies, such as slides and washouts, the value of which it is impossible to estimate, but which nevertheless exists. Much of it is also available for other service when not required for construction. A number of roads use their construction cars for carrying coal and other revenue traffic when out of construction service, while the steam shovels are frequently used to load storage coal, etc.

# Letters to the Editor.

## HAND SIGNALS FOR ENGINEERS.

WILKESBARRE, Pa., February 22, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have noted the hand number signals for engineers, printed on page 351 of the *Railway Age Gazette* of February 21, and while these signals are very good, it would seem to me that there might be opportunity for several of them to be mistaken or confused when read from some distance. I give herewith a code of signals used for the same purpose by some of the engineering corps in the construction department of the Pennsylvania on

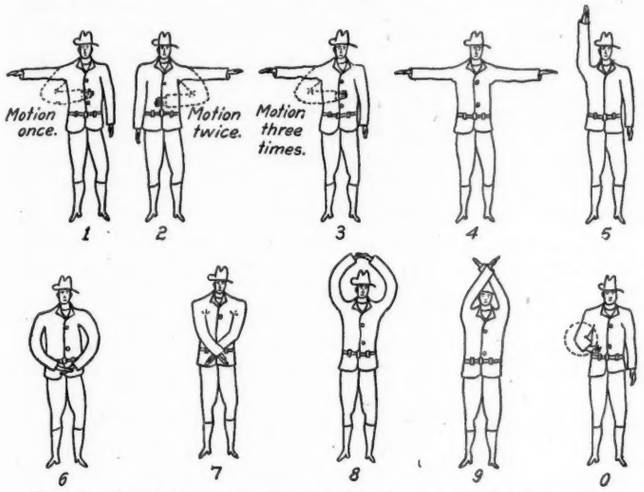



**Fig. 1—Hand Number Signals Used on the Pennsylvania.**

the lines east of Pittsburgh and Erie, which I think give less liability for error.

W. W. PORTSER,
Assistant Supervisor, Pennsylvania R. R.

[Another system of signals which has been used on some of the western roads with good results and with little confusion is to a certain extent a combination of the two systems. As shown

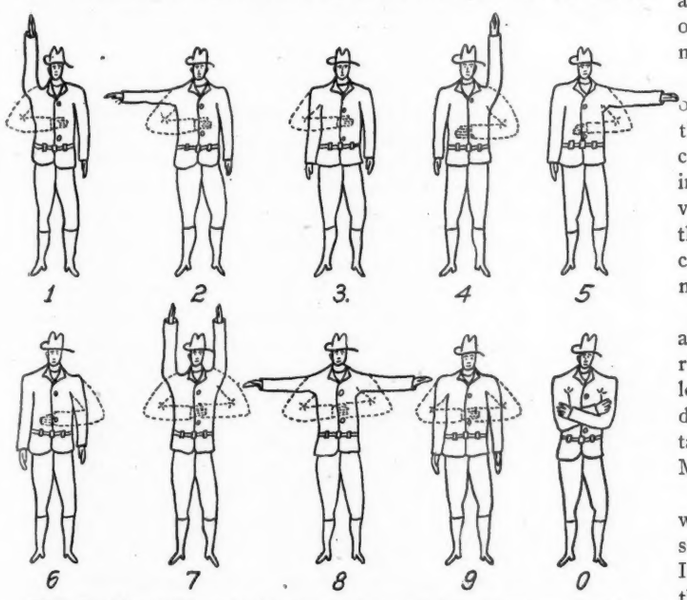



**Fig. 2—Hand Signals Used on One of the Western Roads.**

in Fig. 2, the right arm in the vertical, horizontal and lowered positions, indicates the first three numerals; the left arm in the same positions the next three, and both arms the following three, while the arms crossed indicate the zero.—EDITOR.]

## STAKING TRACK CONNECTIONS ON ACTUAL CENTER LINES.

CHICAGO, February 25, 1913.

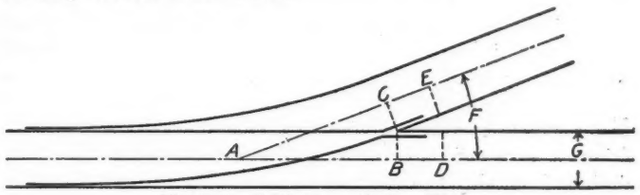
TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the issue of January 24, 1913, there appeared an article by W. H. Wilms, entitled "Notes on Staking Out Track Connections," which was very interesting.

Early track experience convinced me that none of the then published field books, or books on track, contained either practical or correct formulas for the location of track connections. As a result I worked out independent solutions for track problems, in which the same offset method was employed which was advocated by Mr. Wilms.

There is no doubt about the correctness of the results obtained by this method, or the method outlined by J. L. Taylor, in your issue of February 21, under the title of, "A Short Method for Locating Frog Points." However, my work and the opinion of other experienced track men seem to justify the statement that the simplest and most expeditious method of solving track problems, either for office or field work, is generally to use the actual center lines and the heel of the frog, rather than an offset line and a curve produced, as in the articles mentioned above.

About 13 or 14 years ago, the importance of the basic principle shown in the following sketch was impressed upon me as being the key to the simplest practical and, at the same time, theoretically correct track work.




**Method of Staking Out a Frog.**

NG=AB=AC and NG+K=AD=AE in which N=frog number; G=gage of track; and K=distance from the point of the heel of the frog.

Starting with the above, demonstrations may be built up, for graphic or numerical solution, for the single problem of Mr. Taylor and for all of those given by Mr. Wilms, that are quite as simple, that require the solution of the same or a less number of triangles and that have the further advantage of requiring no superfluous offsets or curves produced.

The track man has the selection of the frog and, in a majority of the cases, the degree of the curve that shall be tangent to the heel of the frog. As Mr. Wilms states, the most practical curve to use is generally one of the same degree as the curve in the switch lead. A table giving the location of the frog for various angles between the principle and diverging track, so that the frog shall be tangent to a curve of the same degree as the curve in the switch lead, will be of practical value to the track man.

If the frog location, taken from such a table, did not fall at a joint, and space permitted moving the frog to avoid cutting rail, the frog may be placed at once at the joint near the table location that will give a curve back of the frog of slightly less degree. The proposition then is a curve problem with a fixed tangent distance and central angle, and is outside the pale of Mr. Taylor's tables.

There can be no doubt that many expensive mistakes in track work are due to improperly set stakes or to insufficient understanding between the engineer and track foreman, or to both. In switch work, I have always preferred to set two stakes on the center line, one a foot ahead of the point of the switch rail, and one a foot ahead of the actual frog point. Or, in very exact work, three stakes, one a foot ahead of the point of the switch rail, and one each at the toe and heel of the frog. In such positions, the stakes stand between ties.

S. S. ROBERTS,
Division Engineer of Construction, Illinois Central.

# WINTER MAINTENANCE METHODS CONTEST.

**Nine Papers Discussing Means of Meeting Problems Incident to This Season and of Preparing for Them in Advance.**

## FIRST PRIZE—HANDLING MAINTENANCE WORK IN WINTER.

By A. M. Clough,
Supervisor of Track, New York Central & Hudson River, Batavia, N. Y.

"Prevention is better than cure!" Many things can be guarded against in good weather to simplify and make easier the handling of tracks, switches and traffic when extreme cold weather prevails.

In the open country, where permanent snow fence cannot be maintained, properly constructed portable snow fences should be placed at the proper distance from the tops of cuts that are known to give trouble. These fences, of course, are placed on the land adjacent to the right of way, for which privilege a small rental has to be paid. Where the width of the Right of Way will permit, stationary snow fence should be built. In some cases planting trees along the top of cuts has been found efficient. Trees, however, suffer from fires in summer and have been known to be broken down and smothered with snow and ice in winter.

Rails of the proper section should be laid on their side in the flange way of all farm and highway crossings to keep the planks from being thrown out by the flanges of wheels. A little salt spread in those flange ways each day will keep them in excellent condition until the crossing can be shoveled off. The ballast should be removed from between the ties to a depth of four or five inches at all frogs, guard rails and switches, and in every case a system of drainage with a catch-basin having a grate covering at each switch in yards and a perfect system of surface drainge from all frogs and guard rails leading to them should be installed. In the open country this should also be done, the surface drainage leading to the side ditches. Salt should be used very sparingly at switches or frogs where the ground heaves as it tends to prevent heaving and when track heaves on both sides of a switch or frog at which salt has been used, high shimming is necessary, which is a very undesirable feature of winter track work. Where high shimming is necessary all shims ¾ in. and up to 1¼ in. thick should be at least 12 in. long and have holes bored for the spikes. Over this height they should be 18 in. long and 8 in. wide and in addition to the holes for the spikes, they should be secured to the ties by ten-penny nails and 8-in. track spikes should be used. Every foot of track that is known to heave at all should be carefully marked in winter and as soon as the weather will permit it should be thoroughly drained and no shimming will be necessary the following winter. The best way to keep main line tracks open in winter is to never let them get closed and this can only be accomplished by having the very best organization and equipment ready at all times, and as men are more plentiful in winter than in summer a substantial force of men should be kept working all the time, ditching, handling cinders, ties, coal, etc., to be ready for emergencies. A thorough canvass should be made of a division and a list of all men available made up and kept at division headquarters. Arrangements should be made with restaurants or commissary stores for a quick and efficient way to feed large gangs of extra men. Suitable cars for handling them should always be in readiness. Plenty of snow shovels, picks and brooms should be kept on hand ready for use and in giving them out each man should be given a check number and made to understand that he must take care of his shovel and return it before receiving his pay.

Snow-fighting equipment should be of the very best and kept at suitable places and in first-class working condition at all times. When a storm is imminent, engines and crews should be ordered immediately, and the flangers started over the most troublesome territory first. As the storm develops in severity or the snow gets deeper snow plows should be ordered out with one or two engines as the necessity arises, then as a last resort the rotaries may have to be called into service, particularly if the wind becomes high and cuts commence to fill up.

Section foremen, trainmasters and engineers should keep the roadmaster and despatchers advised of local conditions. The roadmaster should stay at his headquarters and not ride around on snow plows, etc., and should be in constant touch with the despatchers; direct the movement of his men and equipment; and augment or reduce his snow-fighting forces as the circumstances require.

By keeping the snow-fighting equipment constantly running and having enough of it, by having fresh crews and engines always ready to take the place of men tired out and engines frozen up, it is seldom that tracks will get blocked. If, however, a train gets stuck in the snow, instant measures should be taken to release it. A train with a good force of men and with a snow plow ahead should be immediately despatched to release the stalled train. The plow should be run as close up to it as possible and the men unloaded, the plow taken back and placed on the nearest siding, the engine returning to the train in the snow and the men having shoveled up to and alongside and under the cars. The cars should be uncoupled in groups small enough to be handled and pulled back. The tracks can then be cleaned and the proceeding repeated until the whole train is released. It is never wise to handle too many cars at once as draw heads will be pulled out or wheels derailed, that will greatly delay the work.

On two, three or four track lines after continued heavy snow storms, when the flangers and plows have been run frequently and the space between the tracks gets filled up, a special snow wing made to be put on a roadbed spreader should be used to remove all snow from the tracks, level with the top of the rail. In using this machine careful flagging is necessary and the assistance of the despatcher is very essential, as two tracks are always occupied while at work, but the saving in manual labor and the efficiency of the work accomplished are well worth all the extra efforts put into it.

Track water pans are perhaps the most expensive and troublesome adjunct to a trunk line of railroad in winter and make necessary heroic efforts to keep the track open and smooth in severe weather. At least one-half of the water in the pan is spilled over onto the track every time an engine scoops up the other half, and no other means has yet been devised to remove the ice from between the rails and alongside the pans but the pick and shovel when preparing the track for shimming. After removing the heaviest part of the ice, a steam hose connected to the pipes which convey the steam to warm the water in the pans, helps wonderfully to clean off the ties and make shimming the track easy. A roadbed spreader used to remove the loose ice from the adjacent tracks or from the shoulder outside the tracks can do the work of 100 men in 30 min.

Melting snow and ice from switches, which is gradually gaining favor, can only be utilized fully by having perfect drainage as before described. While yet in its experimental stage this method is found to work best in daytime, the glare of the strong light having the effect of blinding men working around it at night and has been the cause of accidents.

In yards a snow train with a large force of men should be kept constantly employed when snowfalls are frequent or continuous. After a heavy storm, all snow should be drawn away to make room for more.

## SECOND PRIZE—HANDLING MAINTENANCE OF WAY WORK IN WINTER WEATHER.

By S. C. Tanner,
Master Carpenter, Baltimore & Ohio, Baltimore, Md.

The maintenance of water stations in winter is very important as we cannot operate a railroad without them, and if they are

frozen up they are of no use. It is only where water tanks are much exposed and in severe weather that the water in the tanks will freeze. Some years ago, however, we had a case at Oakland, which is located in the mountains, where the tank became frozen to such an extent that we had a shortage of water. With a few hours work of two men we turned the exhaust pipe from the pump down into the tank of ice and water, and in a very short time the ice was all melted and we had no further trouble. We also ran a coil of pipe into the penstock pits and used the exhaust steam to keep them thawed out. This can be done at a small expense at any place where the pump house is not too far from the tank. This plan always proves efficient and is about the only way to prevent track water pans from freezing. On account of the length of such pans live steam is required.

Our new water tanks are made frost proof, and where tank spouts are used, the outlet spouts are placed at an angle of about 45 deg. leading from the tank valve so that water will not remain in the outlet spout long enough to freeze. Our new pen-stocks are of the anti-freezing type placed in frost-proof pits. Where snow and ice accumulates on tracks adjacent to penstocks and tanks, the best method of taking care of it is by running steam lines from the pump house if not too far away. In case the pits are over 500 ft. from the pump house, salt freely sprinkled on the ice will remove it.

Success has been had in keeping snow and ice from yard switches where steam is available by placing steam pipes between switch ties below the ballast, the steam being turned on as needed, but the most convenient and effective method is the use of the snow melting device now on the market. Salt sprinkled on switches is also very effective.

To keep the line open for traffic it is best to prevent snow from drifting onto the tracks if possible. This is easily accomplished by setting up portable snow fences where snow is liable to drift. These are made of 1 in. by 6 in. chestnut, 16 ft. panels, 6 boards high and set up like a sawbuck, joining the panels together at the ends and making the fence as long as required. These fences should be placed 50 ft. from the track on the side the snow drifts form, and as many strings of fences 50 ft. apart as the local conditions may require. When tracks become covered, snow plows and flangers are about the only means we have of keeping the tracks open and these should be run over the tracks as often as the conditions require.

Concrete for bridges or other construction should not be placed in freezing weather, but when it is necessary to do so the aggregate and water should be warmed and after the concrete is in place, small camp fires built around it will prevent freezing until it sets, or if this cannot be done the concrete should be covered with building paper and that covered with warm sand or cinders.

Other bridge work can be handled in winter as well as summer, but to protect men from slipping when the structure is covered with ice, we sprinkle cinders or sand where the men are to walk to make it safe for them. Much trouble is also experienced with some of our safety crossing gates freezing up in the winter months. Proper drainage is about the only help for gates which are not of the anti-freezing type. Gates which are directly pipe connected, with the pipe placed in a larger one and run through stuffing boxes or the pneumatic type do not freeze.

Track scales are also troublesome in freezing weather, and where steam plants are available we place pipe coils in the pits and use steam to keep them thawed out. Where steam plants are not located near enough for this use, the scales are quickly thawed out with steam from yard engines used through a steam hose and applied directly to the ice.

One of the most important parts of winter work is the maintaining of water lines and water barrels for fire protection. We locate all water lines as much as possible where the frost will not reach them. This is best done by placing them in the ground below the frost line. Where risers come up into buildings, when conditions will permit, a frost-proof valve is placed at the intersection of the main line and riser, which is operated with a long stem key reaching below the frost line, the valve being properly drained. Where this cannot be done, the pipes must be well covered with frost-proof covering, and when the weather is severe and there is danger of freezing, a 3/8-in. tap made in the extreme end of the fire line and left open will cause a light movement of the water and prevent freezing.

In water barrels used for fire protection on bridges and buildings we use ½ bushel of rock salt well dissolved in each barrel of water. We also place in each barrel a box 10 in. by 10 in. x 6 in. made of cheap rough lumber, with a stick 2 in. x 2 in. for a handle placed in one corner of the box long enough to reach the top of the barrel when the box is at the bottom. The stick will prevent the barrel from bursting if the water should freeze, and at the same time provides a dipper to be used in case of fire. These dippers are of no value for any other purpose and are therefore never disturbed or removed from the fire barrels by outside parties, whereas, if fire buckets were used they would not remain in place over night. The rough box with the long handle costs less than half as much as a regular fire bucket.

## THE UTILITY OF THE WINTER FORCE.

By F. W. Patterson,
Assistant Engineer, Chicago, Burlington & Quincy, Chicago, Ill.

Perhaps the best advice as to handling any but the absolutely necessary maintenance or construction work in winter is that of Punch to the young couple about to be married—"Don't." All work done during the summer season should be performed keeping in mind that period of the year when forces are reduced and weather conditions are such that the efficiency of the men is lowered.

Aside from the removal of snow and ice, perhaps the greatest amount of work to be done during freezing weather is shimming, necessitated either by low joints or by heaving. The underlying cause of both of these conditions is poor drainage and should be removed during the summer months by the use of tile. Perhaps there is no expenditure that will yield so large a return on the investment as the intelligent use of tile drainage, and while it is extensively used there are still many places where it could be employed profitably, especially on branches of light traffic, where the winter forces resemble a Central American army on a peace footing—all officers and no privates. Shimming in itself is expensive work besides containing elements of danger, increasing the liability to spreading track and broken rails.

An important item of "winter work" during the summer is the care of portable snow fences. As soon as the necessity for their use is over they should be piled carefully at some convenient place on the right of way and protected from fire by keeping all grass and rubbish cleaned away from them.

As winter approaches the ballast should be dug away from under all switch points and spring frogs nearly to the bottom of the ties so that snow and ice may be easily removed before they interfere with the moving parts of the turnout. Yard and sidetracks should be thoroughly "cleaned up" not only as a matter of safety, but also to facilitate the removal of snow.

The question of the size of the gangs for the winter is one requiring close study and is one that is particularly vexatious in that large portion of the country between the Allegheny and the Rocky mountains, and the Ohio river and the latitude of Chicago. Over this area the winters are sometimes mild enough to allow and even demand surfacing and lining almost all of the time while others are so severe that it is impossible to do such work from the first of November until March, and the winter force must confine its activities in track work to shimming and spike lining.

With such diverse conditions to be looked for it is clearly difficult to provide a fixed limit for the size of the gangs and the roadmaster and section foreman should be allowed some discretion in increasing their forces to meet emergencies, care being taken that this latitude be safeguarded against abuse. There are, perhaps, few easier ways to waste money than by maintaining section forces when weather conditions render efficient work impos-

sible, but on the other hand there is no season in the year when the proverbial "stitch in time" will save more needlework in the future.

Increasing forces for the beginning of spring work affords as good an opportunity for saving or wasting money as does the size of the winter force. While it is most desirable to begin work at an early date, there is such a thing as getting too early a start and paying out money for work that is not done, or if done, is of no real benefit. Branches of light traffic, having either "mud track" or only a light application of ballast offer chances for real economy by taking care that forces are not increased until good work can be done. This was impressed on the writer's mind most vividly some years ago on a branch line where the usual winter section force comprised the foreman only, and where it had been customary to increase to the spring rating on March 15. In the year in question the early part of March was very wet and it would have been impossible to do efficient work, even if the gangs had been put on. Accordingly, each foreman was seen and told that while authority had been given the roadmaster to put on additional men on March 15, none would be put on until weather conditions would permit satisfactory work to be done, except in emergency cases when the foreman would be allowed to hire men temporarily, making prompt report to the roadmaster in each case. A few demurred, but after a little argument all agreed that it was a wise policy. The wet weather continued and it was almost the first of April before orders were given to put on the men. Just as the order had gone out the roadmaster of an intersecting branch line of another road was met who had a tale of woe to unfold concerning such fine weather with no men for the sections. As it was known that this road had increased its forces on the fifteenth the roadmaster was asked what had become of his men. "Oh," he replied, "we've exhausted our appropriation for this month and have to lay them off until the first of next month, and you ought to see the shape our mud track is in with the messing around they've done on it the past ten days."

The practice of doing as much winter work as possible in the summer, and of postponing spring work until spring will save money, frosted fingers and bad temper, all matters in which economy is highly commendable.

## CONCRETING IN COLD WEATHER.

By A. S. Markley,

Master Carpenter, Chicago & Eastern Illinois, Danville, Ill.

In carrying on concrete work in cold weather where the work is exposed to the elements, numerous precautions must be taken. The placing of heavy tarpaulins or tents over the forms, securing them to the ground or to the floor to exclude cold air, is one means of protection. Inside the tarpaulins, which should be large enough to allow some circulation outside the forms, steam pipes from ¾ to 1½ in. in diameter should be placed with sufficient radiation to heat the interior. An ordinary vertical boiler of sufficient capacity to supply steam for heating both the enclosure and the water used in the concrete is necessary.

Water is best held in barrels in which live steam is run to maintain the proper temperature. Steam can also be utilized for heating the stone, sand, or gravel by piling these materials over pipes properly trapped at the outlet through which live steam passes. Another way of heating the materials is to secure a cylinder 12 in. to 18 in. in diameter made of No. 8 iron 12 ft. to 20 ft. long and open at both ends, in which a wood fire is kindled. Material piled over this will be heated and the frost excluded. With this arrangement, however, a night man is necessary to maintain the fires and to have material ready for the workmen on their arrival in the morning.

Where the concrete is submerged in water, forms should be properly built and allowed to fill with water. The concrete can then be deposited under water through an 8-in. tube made of galvanized iron with a hopper at the top sufficiently large to receive the mixture from wheelbarrows. The lower end should be kept sealed on the bottom and as fast as the pipe is filled with concrete it should be raised sufficiently to allow the material to escape at the bottom. A very uniform concrete can be made in this way, as where there is no fluctuation of the temperature the concrete sets uniformly. In addition, as it is submerged, all voids are filled in without the necessity of tamping or spading.

## WINTER MAINTENANCE OF WATER STATIONS.

By J. H. Markley,

Master Bridges and Buildings, Toledo, Peoria & Western, Peoria, Ill.

Last winter was a very severe one on the water service branch of the maintenance of way department in this locality, and I am proud to say that not one locomotive pulled up to a tank on this road, but what secured water without delay, except in one case and this was at an isolated tank very seldom used, and which is fed by a spring. When the winter set in, as it did, very severe, I notified all pumpers to be on the alert, and when conditions were such that they could not properly handle them to let me know and I would send relief. Every man realized the situation and exercised an added interest in his charge, and every one of them mastered the work in hand successfully. Their highest aim was that no failure should take place and this interest brought them success.

Experience has taught us some priceless lessons on the care of water tanks during severely cold weather. The practice used to be to wait until it became very cold and then start out with a car load of sawdust and rough lumber to box up the goosenecks and the discharge pipes of the tanks, and fill the boxes with sawdust. This did some good, but it was not a perfect success.

We use no sawdust now and where we have no return pipes from the tanks which must stand full of water, we use no protection whatever. The discharge pipe runs up through the center of the tank to a point above the water line, when the tank is full, and is drained as soon as the pump is shut down. We drain these pipes whether they are boxed in or not.

When tanks are connected to stand pipes or any return pipes that must stand full of water, we box up around the four center posts, by first setting up 2 in. by 4 in. studding, faced with the out side of the post. On the out side of these timbers is laid a very heavy tar paper, then drop-siding. The paper keeps the wind from coming in contact with the pipe. On the inside of the studding is a lining of No. 2 flooring. This forms the first and important dead-air space. After the return pipes are installed they are boxed in also. This makes three dead-air spaces, and so far has proved a success. The door to this inclosure is made similar to those on refrigerator cars, including its fastening.

At two points on our line where we got our water supply from ponds or creeks, we have trouble during extreme and continuous cold weather with ice forming on the bottom and around the inside of the staves. At one of these points where we have a gasoline pump we installed a small 24 in. by 60 in. steam boiler in the pump house and laid a ½-in. pipe from the boiler into the tank to thaw the ice with steam. In the spring the pipe is taken down and stored in the pump house. At another point where we have a steam pump, we laid a ¾-in. pipe alongside the discharge pipe, extending about 2 ft. above the ground under the tank. When necessary a pipe can be connected to it and used with the same result as explained in the former case.

Another very important feature in connection with tanks during cold weather is the outlet valve. We are using the stopper valve, which I think is the very best. It sets up 12 in. from the bottom of the tank and the seats are made of the best grade of harness leather. These valves have always proved reliable in the extreme cold weather.

## SOME METHODS OF HANDLING SNOW AND ICE.

By F. W. Fuller,

Roadmaster, Northern Pacific, Dilworth, Minn.

We plan for and usually get six months of winter up here, and the snow when not falling is being blown around. We begin to prepare for this in September by seeing that all grass on the right of way is burned and all weeds mowed. The next thing is to place the portable snow fence so as to protect all small cuts,

and see that all large cuts are protected in like manner or by a six-foot permanent fence, built from 100 to 300 ft. from the track. All switches and sidings are protected in like manner.

Keeping switches in service is no small matter in so cold a climate, as we find the use of salt in zero weather does more harm than good. It starts the snow to melting, which then freezes hard. Cleaning switches by digging the dirt all out down to the bottom of the tie in the fall gives some room for loose snow. Then we leave at each switch a broom, an old No. 2 shovel and a chisel made from an old file, which is sharpened at one end and fitted to an old ferrule from scuffle hoe or fork, so that it will slip onto the broom handle. This can be used to clean ice from the switch point, and will save many calls on the section forces at night as the train crew can clean a switch so as to get through safely.

In cleaning around stations we find the use of a team and a snow scraper such as is used to haul the snow off the ice by ice cutting gangs, a very convenient and cheap tool, taking the place of fully a dozen men with snow shovels. We also use the Jordan spreader in cleaning up the passing tracks and yards, using it on snow in the same manner it is used on ballast. Of course, we keep the necessary wedge, Russel and rotary plows in good shape and in use when necessary. All engines are equipped with air flangers, forward of the pony trucks, operated by the engineer as needed.

## WINTER TRACK WORK.

By L. C. Lawton,

Division Engineer, Atchison, Topeka & Santa Fe, Newton, Kan.

We have found that much of the track work usually done in winter can be done to much better advantage in the fall, both as to cost and standard of track. This is especially true on the many western branch lines with little or no ballast, but will apply to main lines as well. Last winter we had a record amount of snow, with heavy winds which filled cuts time and again. Our cuts were 20 or 22 ft. wide, but snow was so packed in the space between slope and track that melting snow could not be drained, and as a result during several thaws, the track was flooded. To avoid this, the cuts were re-tied early last summer so that the roadbed would be as compact as possible by winter. In several places holes caused by sinking of ballast, which held water under the track, were sub-drained. A thorough campaign was then made over the division and a spirited contest aroused between roadmasters as to who would have the best drained cuts. Cuts were widened to full section, either with team or train, and ditches made as low as possible, always making the inside slope of the ditch start from the ends of ties. The grade of the ditch was also increased as much as possible.

Another protection to those cuts which gave the most trouble last year was an increase in snow fences, built in a more scientific method. Those built within 50 ft. of the track were made tight and close to the ground, and placed to best advantage on waste banks to get the largest possible drift of snow behind them. In a few places two lines of fence were built where cuts were deepest. This has reduced our snow bucking to a minimum, and the snow left in the cuts has drained freely with no injury to the tracks so far this year. This is partly brought about by section men cutting a trench through drifts a foot or so outside the ends of ties. Unless we have an unusually wet spring, we are quitting the winter at least two months ahead of our usual schedule in track work. The great saving, however, comes in having safe track for operation of our trains. We have added to the efficiency of our trains and rolling stock by doing away with slow orders and added not a little to the safety of all employees.

## WINTER CONDITIONS AND THEIR REMEDIES.

By Jos. J. Morgan,

New York Central & Hudson River, Kingston, N. Y.

Probably no more serious conditions are encountered as the result of blizzards, than those existing in large yards at terminals, etc. In order to clear certain main tracks of snow it is often necessary to block other less important tracks in the yard, which in turn have to be cleared. Why not take care of this snow in the first place? After the main tracks have been cleared with snow plow, a gang of men can follow up the plow, loading the snow on cars and dumping it at some safe point. The advantages of this method are numerous. Warm days frequently occur during the winter when the snow which is piled between tracks (an unsafe practice in itself), melts, the water running around the switches and freezing during the night, resulting in much annoyance, delay and the expense for its removal.

It is a well-known fact that rail breakages are numerous during the winter season, especially after sudden cold periods. Everything is being done to minimize these breakages; but, it seems at present that rails will break under these conditions notwithstanding the closest study. Therefore additional attention should be expended in looking out for such breaks by placing extra trackwalkers on each section, so as to admit of more frequent and careful examination of all rails in main tracks, thus insuring "safety," the watchword of the present day.

The changing of seasons seems to be occasionally overlooked by the foremen, in that they allow their stock of winter necessities to remain very low, if not entirely exhausted, until the time arrives when such items are actually needed for use. In order to insure the prompt handling of the difficulties which subsequently arise as a result of cold weather, it would be well for supervisors to issue a "reminder" to their foremen some time prior to December 21, calling their attention to the necessity of having an adequate supply of snow shovels, snow brooms, track shims, etc., on hand, so as to be prepared for such conditions.

The winter season can be handled just as expeditiously and profitably as any other season if there exists: First—An absolute preparedness to cope with the conditions incident thereto. Second—An unflinching carefulness on the part of all concerned. Third—A considerable amount of special attention given to rails and fastenings in main tracks, which are liable to be affected by winter conditions.

## WINTER TRACK WORK.

By F. A. Kell,

Roadmaster, Missouri Pacific, St. Louis, Mo.

To make the handling of maintenance work economical during the winter, the track must be so handled during the summer months that at the beginning of the winter it will be in as near a perfect condition as possible. All ties actually needing renewing during the year should be renewed before winter. All tracks should be surfaced and lined and the ballast properly dressed. All ditches should be cleaned out to the standard width and uniform depth so that the water will quickly drain from the roadbed.

The old leaves, grass and other rubbish should be cleaned from the ends of all culverts, sluice drains or sewer pipes so they will not become clogged up and cause an undue amount of rain or snow water to stand in pools and soften the roadbed. After a heavy fall of snow, or especially when snow commences to thaw, where practicable, a ditch one or two shovels widths wide should be cut through the snow in the ditches so that the water from the snow melting will run off and not stand in the ditch or the roadbed. A few dollars spent in this way at the proper time may keep a soft spot from forming in the roadbed which would cost a great deal more to remove, to say nothing of slow orders that might be required to properly protect trains over this soft spot, and possible wrecks. Good drainage is the chief factor in economical maintenance of track. A good, live, energetic foreman will not neglect the drainage of his track at any time of the year, especially in winter weather.

After the track has been put in first-class condition by well organized gangs during the summer, the forces should be reduced as much as practicable, taking into consideration importance of track, amount and kind of traffic, and climate. All track and frog bolts should be inspected once a month throughout the year and the loose bolts tightened. This is far more important work than some seem to think and requires the special attention of the

section foreman to see that this is properly done and especially in the winter when it is freezing and thawing and joint ties have a tendency to churn if the ballast is not properly taken care of. A foreman that takes the proper interest in his work can tell at a glance if the bolt is loose or not, and if not loose it should not be touched, for if he tries to make it tighter he will probably strain or break the bolt, causing unnecessary labor and waste of material.

If track bolts are allowed to become loose and remain so, it will not be long until the angle bar and both ends of the rail where angle bars and rails come in contact with each other will begin to wear, and in order to make a good joint new angle bars and all new bolts will be required. This means a heavy expense, also damage to roadbed and additional cost for raising low joints and surfacing track, when a small per cent. of the total amount spent at the right time for keeping all bolts tight would save angle bars, rail, ballast, and labor. In yards and terminals, the tightening track and frog bolts should not, under any circumstances, be neglected.

During the winter as in all other seasons, yard and terminal tracks should be kept clean of all dirt and trash. In busy terminals, especially in the freight yards and lead tracks, there is a great amount of dirt and rubbish which falls from cars during switching. This is more economically cleaned up by regular yard cleaners who are assigned a certain territory with suitable shovel and wheelbarrow. If possible, in large yards there should be short spur tracks built at several points in the yards if there is no other track that could be used for this purpose on which to keep dump coal cars so that yard cleaners can wheel cleanings to these cars and load them. By doing this, unsightly piles of dirt in the yard are avoided and tracks are always kept clean without the extra expense for work train in loading this dirt.

The accumulation of dirt in large terminals stops up drains and water ways and when sand and dirt get under the rails they cause the rails to cut down in the ties faster than when kept clean.

During the winter months when there is not too much frost in the ties, on all track that is getting out of gage or rails turning, the ties should be properly adzed and old spike holes plugged and track put to good gage. This will save a great amount of labor when renewing ties the following year if ties do not have to be renewed out of face which would not seem practical except under certain conditions.

At the commencement of winter all switches should be gone over and the dirt properly cleaned from around switch rods and under switch points between the ties. Good judgment should be used in this, as I have noticed some men clean the dirt out very near the bottom of ties, leaving a large deep hole for water to stand in, or some switchman to step in; also requiring unnecessary labor to remove this dirt and haul it away.

The handling of maintenance work during the winter months makes necessary a reorganization of forces which must be handled with diplomacy if the proper results are acquired. As the forces are reduced, foremen are too apt to get the impression that they have not enough men to do much work and do not make any effort to show an improvement, but simply put in the time some way until the next spring when they will get more help. Any improvement made, no matter how small, will show in the next year's work and if there is no improvement there is a tendency to go backward.

## GENERAL COMMITTEE MEETING, ROADMASTERS' ASSOCIATION.

At a general committee meeting of the Roadmasters' and Maintenance of Way Association, held in Chicago on February 15, 63 roadmasters from 22 different railways were in attendance. The meeting was called for the purpose of discussing economical maintenance methods outlined in the work of the various committees of the association for the coming year. The large attendance at this meeting indicates the widespread interest of the members in the work of the association this year.

## HEATING THE EMBANKMENT ALONG TRACK PANS.

One of the most serious maintenance problems encountered on roads using track pans at water stations is the removal of ice which collects in large quantities between the tracks because of the large quantities of water thrown from the pans by engines taking water when running at high speeds. To eliminate this trouble by preventing the formation of the ice, a steam heating

**Ice on Departing End of Track Pans.**

system between the tracks has been installed at Dola, O., and Davis, Ind., on the western division of the northwest system of the Pennsylvania lines. At these points two lines of 3 in. pipe are laid about 3 ft. 10 in. apart and about 21 in. below the top of the ballast between the tracks in which the track pans are constructed. One inch oak boards are placed under and on top of the pipes, which are then covered with ordinary stone ballast. These lines are crossed at intervals of about 300 ft. in concrete pits where condensation traps and swing joint expansion con-

**End of Track Pans, Showing Steam Pipes.**

nections are provided. The pipes are also anchored at intervals of about 300 ft. midway between the expansion pits. The lines of pipe are carried about 35 ft. beyond the ends of the track pans to dead ends with valves for the exhaust of air.

The two lines of pipe are supplied with exhaust steam at about 25 lbs. pressure from a 6 in. line leading from the power house to a point midway between the ends of the track pans. An arrangement is provided enabling live steam to be supplied at a greater pressure if necessary.

It has been found that these pipes effect an important saving in the labor otherwise required to remove the ice from around the track pans. It has also been found that this arrangement can be improved by extending the heating pipes about 150 ft. beyond the ends of the pans. As now installed, this system does not entirely eliminate the collection of ice along the outside of the rails, but it is expected that this situation will be improved by laying a system of hot water pipes along the outside of the rails within the limits of the track pans, crossing it under the rails at the ends and then extending it alongside the rails about 150 ft. at the leaving ends of the track pans, this arrangement being only temporary and to be removed during the summer. At both of these stations there are sidings beside the track pans and it is proposed to construct similar heating arrangements between the main tracks and sidings.

We are indebted to Guy Scott, division engineer of the Western division, for this information.

## SNOW REMOVAL BY STEAM RADIATION.

By J. W. FOOTE,
Division Engineer, Erie, Salamanca, N. Y.

Of the various kinds of snow and ice removal by heat, that by steam radiation is probably the most efficient. At a terminal where steam is avilable this system is particularly effective and economical and it is included in the standard practice of the Erie where it is giving good results. The simplicity of the arrangement commends itself. It consists of two 1 in. pipes, joined together by a return bend, placed between the switch ties, in a series consisting of four to six return coils for each switch. Each switch installation is connected with a main lead pipe which varies in diameter from one inch, for four to eight switches, to two inches, for nine to fifteen switches, not more than fifteen installations being connected in series. Each switch installation is equipped with a ¾ in. steam trap at its lowest point so that the condensed steam drains off automatically. The ballast is first removed at the locations of the installation to a depth of three or four inches below the base of rail and the ends of the steam pipes are supported above the roadbed upon wooden blocks. The steam pipes are not perforated but perform their function by direct radiation. The lead pipe is covered and is above the ground.

Once the plant is installed it is a simple matter to remove the pipes at the close of the winter and store them for the following year, when they may be set up very quickly at a nominal expenditure. Where this arrangement is in place, no attention need be paid to the points, provided the steam pressure is ample. The snow is melted as it falls and the points are kept perfectly dry and free from snow and ice. This scheme, of course, is applicable where team is already available and at points where it would pay on account of a large number of switches to install a power plant. However, as a general thing the outlying switches on most railways are so few in number on main line sections that the usual winter force can adequately take care of them by hand, and in fact can find no other work to do in time of snow.

This same principle is applied by many railways to keep the pit rails and the centers of turntables free from snow troubles. A single steam pipe line equipped with a trap will keep the pit rail perfectly clear of snow at all times, and a series of pipes laid in circles around the center does similar service there. At a busy terminal the advantage of a free turning table is too apparent to require any explanation of its help to keep traffic moving.

Another cause of the high cost of winter operation is the unloading of cars of frozen material, such as coal, cinders and sand. Railways engaged in the unloading of coal in large quantities maintain systems of coal steaming. In some cases perforated steam pipes with pointed ends are driven into the coal and the escaping steam drives out the frost. This results in a great loss of the energy of the steam and at the same time is expensive. In other cases large steaming houses are provided. These houses are lined with sheets of galvanized or lohmanized iron, and provide room for steaming eight or more cars at a time. This system depends on air heated to a high temperature by coils of steam pipe thawing out the coal and in time of severe weather several hours are required to secure the desired result at a high cost and loss of time in unloading and in switching in congested territory. It would seem feasible to equip cars engaged in this service with steam coils and secure the radiation of the steam pipes directly upon the frozen material. These cars could be placed upon a steam line and thawed dry in a short time, eliminating the present heavy maintenance cost of buildings and the loss of time. Of course, this would mean a large first cost, but if it were made a part of the standard equipment it should fully repay the first cost. In any event, cars assigned to cinder service could be so equipped.

## WATER REQUIRED BY A LARGE RAILWAY SYSTEM.

A paper was presented before the annual meeting of the Illinois Water Supply Association at Champaign, Ill., on March 11, by C. R. Knowles, general foreman of water works, Illinois Central, from which the following abstract is taken:

The consumption of water by railway systems has greatly increased, and it has been necessary to raise the standard of the supply both in quantity and quality to meet traffic conditions. In former years it was the practice to erect a tank and establish a water station at any point where water of any kind was most convenient, with little regard to the quality or future requirements. This has necessitated many changes to meet the new conditions and added requirements, such as relocating water stations with due regard to curvature, grades and the many previously unknown expedients of operation.

To accomplish these results it is often necessary to pipe water a considerable distance, or if an ample supply is not otherwise available, to sink wells or construct a reservoir impounding a storage supply. In the event that the available supply is not satisfactory in quality, it is often necessary to erect treating plants to convert it into a suitable water for locomotive purposes. All these changing conditions and increasing requirements have made it necessary to maintain a water works department organization whose duties are similar to those of a city water works department.

The amount of water required for all purposes by one railroad 6,500 miles long is approximately 16,500,000,000 gal. annually. In the state of Illinois on 2,000 miles of road, 4,236,838,000 gal. of water was used for locomotives alone, of which 1,751,790,000 gal. is purchased from municipal and privately owned water works plants and 138,645,000 gal. is treated by purifying plants owned by the railroad. It is necessary to maintain 123 water stations to distribute this water to locomotives. In addition to the above, the washing and filling of locomotive boilers at terminals requires approximately 950,000,000 gal. per annum, which is provided by the same pumping plants with additional facilities for maintaining the desired pressure for washing the boilers and the necessary pipe line for the distribution of this water under pressure.

Stationary power plants also require approximately 300,000,000 gal. per annum, including water used for condensing engines, of which 125,000,000 gal. is city water. It is estimated that 250,000,000 gal. additional is required for miscellaneous purposes at shops, roundhouses, offices and stations. This makes a grand total of 5,736,838,000 gal. of water used for all purposes by this one road in Illinois alone.

NEW LINE FOR ECUADOR.—Plans and specifications will be received up to March 20 at the Dirección de Obras Públicas, Quito, for construction of a railway between Puerto Bolivar and a navigable point on the river Zamora, with the object of opening up the districts of Zaruma and Loja.

# EARLY TRACK WORK.*

By Engineer.

The coming season is likely to be one in which it will be hard to obtain men for manual labor. The wars in Mexico and Europe are likely to cause a scarcity of immigration of laborers from Mexico, Italy, Austria, Greece and all Southern Europe, from which localities the greatest number of our laboring men have been coming in recent years. It is reported that an Austrian government edict forbids any male citizen between the ages of 18 and 40 to leave any Mediterranean port during 1913 or until the edict is removed. In Italy, the newspapers are attacking laws on the rights of aliens passed by a number of states to try and discourage emigration to this country. Emigration from both Italy and Austria was unusually low for the month of February, when it is normally very high. A larger number of these nationalities than usual returned to their native lands last year, so that the indications are that men will be few and scarce. Consequently, railroads which employ and get their laboring forces on the ground at the earliest date possible will have a very great advantage over the other roads in getting their work completed.

Under usual weather conditions the coming month of April is the proper month to begin track work throughout the northern states, and it can not be too strongly emphasized that forces should be organized and started to work at the very earliest opportunity. This not only gets the work under way in the proper season, but gives the roads first on the ground the advantage of getting the best men and the gangs that are best suited for the different kinds of work. The gangs for rail laying and heavier work should as far as possible be men of larger size and greater physical strength; men from northern Europe, negroes or hobos.

All of the nationalities of Southern Europe furnish gangs which are good track men and also gangs which are poor track men. Their quality depends to a large extent upon the interpreter and foreman; also there is the usual difference arising because men of the same "calibre" and same class in life seem to congregate.

The local laborer is by far the best of all, and the earlier in the season the work is started the more likelihood there is of being able to obtain local men to fill out the ordinary section and bridge gangs, and when these men are once employed they are much more likely to stay with the company throughout the season. The railroads are not likely to obtain them at all if they wait until later in the season.

The railroads have apparently planned on much new work for the coming season and on account of the scarcity of labor, wages are likely to be high, and this without increasing the supply very materially. Indeed, some of the roads have already begun to raise wages in order to offer a little more than their competitors.

It is a wise policy to arrange for more comfortable and sanitary camps than is customary in order to retain the forces which are hired. All men are human and even the poorest laborer prefers a clean place to sleep and clean, wholesome food to eat. Bunk cars and all boarding cars should be properly made and equipped for the season's work. Screens should be prepared so that at the proper time they can be used, and cars should be furnished in perfect sanitary condition in such numbers that the laborers will not be crowded.

As soon as the frost begins to go out of the ground the section men should as rapidly as possible take out all the shims and surface up the low spots so as to get the track in good surface and well drained. Extra gangs should be started laying rail, putting in ties and ballasting. This naturally pre-supposes that rail has been shipped and that the ties are on the ground or on the way, and that the ballast pits are open and ready for the steam shovel. If the rail is not on the ground it is time to get after it and hurry it all possible. It is also time to have the ties distributed, and efforts should be made to get them delivered as soon as possible.

The section men should clean up around the depots, open all ditches, clean up the right of way, look after the road crossings, cattle guards and fences, straighten up signs that have sagged as the frost has gone out of the ground, and get everything in neat shape and ready for spring track work so that they can give the latter their undivided attention until completed.

Where construction work is to be done, it is time to get the teams started, steam shovels under way, which will require a release of equipment which may have been in coal or other service and which can now comfortably be released from that service and repaired, equipped and put into the construction work. Where dredge work is to be done preparations should be made so that as soon as the ice is gone from the water where the dredge is to operate it can be put into operation.

Concrete gangs should be equipped and located on the ground and material for them should be looked after so that work can go ahead which may not have been economical in the winter on account of its location or on account of the severity of the weather. However, this class of work can often be carried on to advantage throughout the year. Bridge repairs should be pushed and all pile bridges and culverts should be fixed in good repair with as little delay as possible, and the pile drivers should begin operations so that they may finish their allotted work.

Material which has been ordered should have begun to come before this, and if not it should be looked up and hurried. Any additional material needed should be ordered without delay. Tools should have been properly repaired, but if this has not yet been done they should be put in shape at once for the season's work. There is a great loss of labor if tools and materials are not on hand when they are ready to be used. This loss is very apparent to the men in charge of the labor and they should give the supply department all assistance possible in getting material on the ground by ordering promptly so that there will be no delay on account of insufficient notice.

On the other hand there is a loss of capital invested if the supply of material on hand is too large and much material will deteriorate if held too long before being used. Consequently, the most perfect arrangement for handling material is to have it delivered just as it is to be used, and the nearer this stage is reached the cheaper work can be done. As this can not be perfectly accomplished and the promptness of delivery depends to a large extent upon the assistance given the supply department by the operating and construction departments, it behooves the superintendent, the roadmaster, the supervisor, the master carpenter, the engineers and all foremen, to find out what material they need, see that it is ordered and find out if it is coming on time, and if not, get after it.

As April is the time for beginning farm work, so it is also the time for beginning railroad work throughout a large portion of the country. A good start in the month of April by the track men, the bridge men, the section men, the signal men and, in fact, all maintenance and construction men will get the season's work well under way, and will insure getting it through on time.

About two years ago one of our large systems decided to begin work early in the season, and in 1911 had over 8,000 maintenance men at work in April, which number was increased to 10,000 in May. The results were good and in 1912 they put over 10,000 at work in April and increased this to over 12,000 in May. The results were excellent, for by the first of June a very large part of the rail laying, tie renewals and ballasting were completed, allowing work in the hot summer months to be slacked up and the work to be kept well in hand throughout the season at much reduced expense. This year will probably see as good or better advancement of the work on this system. April is the month for beginning, and a good beginning is half the battle. One day's work in April or May is worth two in July or August.

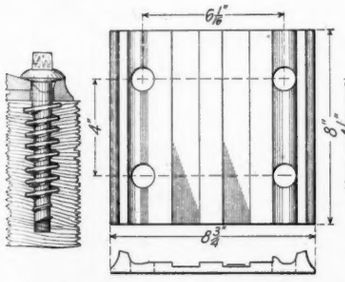
*The second of a series of articles on this subject. The first appeared on page 351 of the issue of February 21.

# DEVELOPMENT IN THE USE OF SCREW SPIKES.

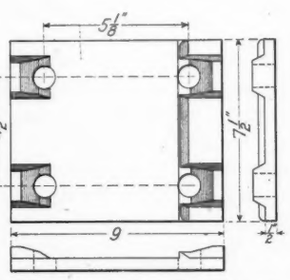
**This Type of More Permanent Track Construction Now Used on 730 Miles of Track. Nearly 200 Miles Installed Last Year.**

No problem connected with the maintenance of track, with the possible exception of that of securing sound rails, is receiving so much attention from railway men at the present time as that of the future tie supply. The number of ties required annually is so large and constitutes such a drain upon the timber resources of the country that it is evident that something must be done in the near future to alter conditions. Either the demand for tie timber must be reduced or a substitute for timber must be found. Much attention is being given to both solutions and definite progress has been made in each. Many designs of steel, concrete and composite ties have been made, and in some instances with good indications of success. However, greater attention has been given to the development of methods for securing a greater life from wood ties, in this way reducing the demand for timber, for it is evident that if the average life of the tie can be increased, the number required for renewal will be correspondingly reduced.

**Screw Spike Track on the Lackawanna.**



**Harriman Lines Standard 90-lb. Screw Spike Tie Plate and Screw Spike with Helical Screw.**

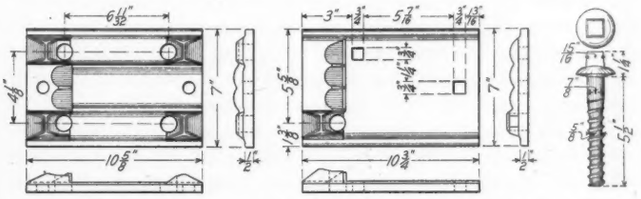


**Atchison, Topeka & Santa Fe Standard 90-lb. Screw Spike Tie Plate.**

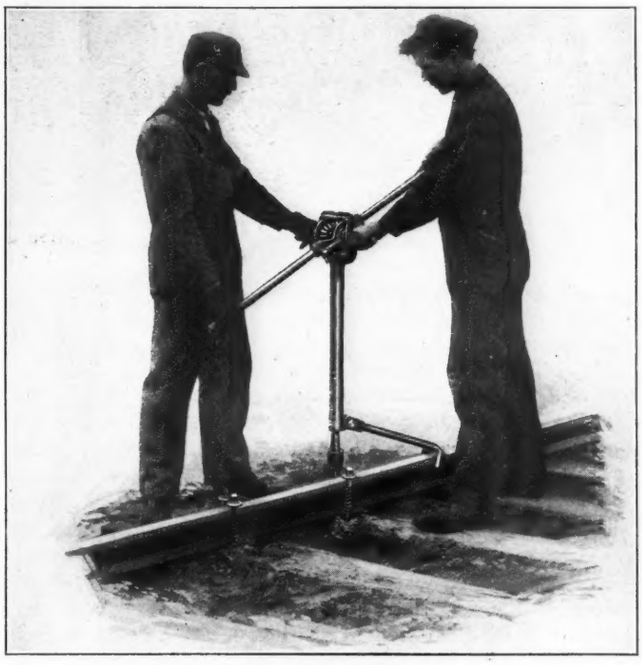
DESTRUCTIVE AGENTS.

A tie is subject to destructive action by decay and by mechanical wear. The former is retarded by treating the timber. Although a comparatively new industry, timber preservation is being extended very rapidly, until it is probable that within a few years most of the ties in track will be treated by some process. Over 75 per cent. of the ties now in track on the Santa Fe are treated, this road being a pioneer in this work and probably having a larger proportion of treated ties than any other large system in the country. However, other roads, such as the Union Pacific, Southern Pacific, Illinois Central, Burlington, Lackawanna and Rock Island also have large numbers of treated ties in service.

The total number of ties purchased in 1910, the latest year for which records are available, as reported by the United States Department of Commerce and Labor, was 148,231,000, of which 30,544,000, or 21 per cent., were treated. This represents an increase of nearly 7,000,000 in the number of treated ties bought over 1908, the previous high year. At least seven or eight new treating plants are under construction, and as many more have been completed within the past year, so that this increase bids fair to be sustained. This large proportion of treated ties is already exerting an important effect on the tie consumption as is shown by the requirements for maintenance purposes on the Santa Fe for this year, which are decreased by 600,000 ties as compared with previous years. This is attributed to the increased life of treated ties, which have now been in the track sufficiently long for the effect to be evident.



**Intermediate Joint, D. L. & W. Standard 101-lb. Screw Spike Tie Plate and Screw Spike.**



**Ratchet Wrench for Driving Spikes.**

As the life of the ties has increased with treatment, the proportion removed from the track because of mechanical wear has increased. This mechanical wear very largely arises from two causes; rail cutting and spike killing. To strengthen the tie

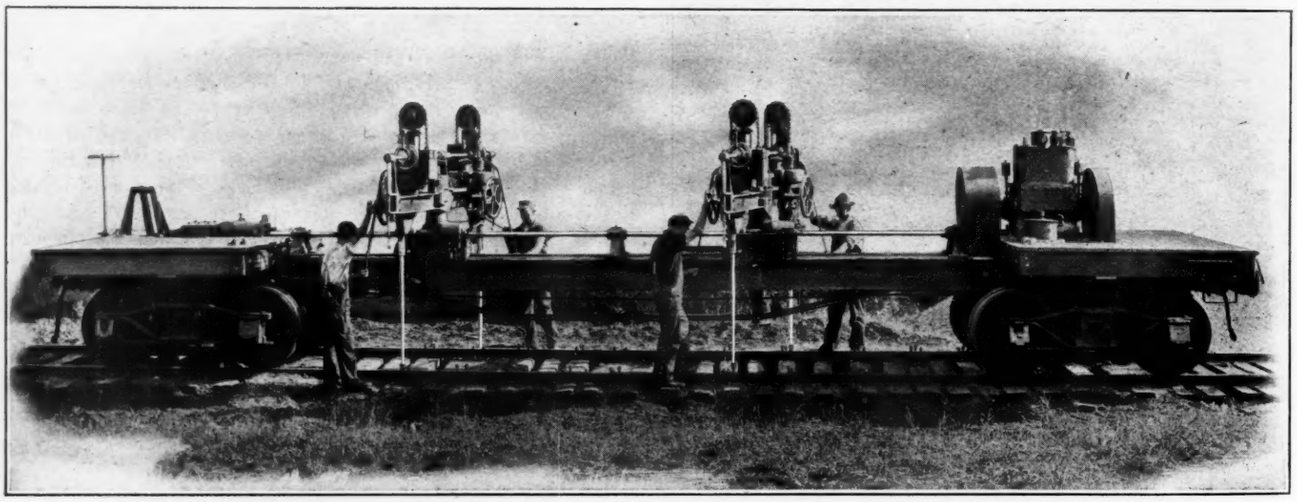
against the former action, tie plates are being used in largely increased numbers, while the size of the plates themselves has been increased to distribute the loads over the ties without cutting into them. This has been largely successful, but it has not been possible to make the plate as closely an integral part of the tie as is desired and the movement of the plate on the tie is frequently the cause of damage to it.

Spike-killing is a source of injury to the tie which becomes more serious as the life of the tie is increased. Tie plugs are generally used to reduce the injury as much as possible, but they are a partial remedy rather than a preventative. At best, spikes must be re-driven when rail is relaid, which occurs on an average of every seven or eight years on main lines. Re-gaging of the track, spacing of ties in connection with ballasting, etc., also greatly increase this spike killing. In this way the mechanical life of the tie is in many cases the governing condition and a number of roads are only injecting sufficient preservative into the timber to give it a protection against decay equal to the mechanical life. As this mechanical life is increased, heavier treatments can be given.

The screw spike is considered by many men to offer the most practical means for increasing the mechanical life of ties. It is effective in greatly decreasing the movement and consequent wear between the rail, tie and tie plate, and at the same time it largely eliminates the spike killing of the tie. The driving of a common spike is very destructive to the wood fiber, cutting and distorting it greatly. Also, after being driven, the spike does not possess a sufficient grip upon the wood to prevent loosening under the movement of the rail. After it has been driven down a few times the timber loses its grip and it becomes necessary to draw the spike and redrive it in another hole. On the other hand, when a screw spike is driven into a previously bored hole the destruction of the wood fiber is practically limited to that occasioned by the thrust of the screw threads. The grip upon the wood and the resistance to pulling are greatly increased by the greater surface exposed to contact. Tests conducted by the Bureau of Forestry at Purdue University several years ago showed that the ratio of the resistance of screw spikes to common spikes varied from 1.87 in white oak to 4.63 in longleaf pine. More thorough and exhaustive tests which are now being conducted by one of the prominent railways, tend to bear out these same conclusions.

When once properly driven, the screw spike does not loosen readily and retains its grip upon the rail for a long time. Cut spikes retard rail creeping only for a short time after being driven, while screw spikes remain tight and in this way greatly reduce the wear of the tie, tie plate and rail upon each other, retard creeping and eliminate noisy track. Equally important with the resistance to vertical pulling is the resistance of the screw spikes to lateral thrust. With its intimate contact with the wood fiber as well as its greater and more irregular cross section, the screw spike offers greater resistance here also. With the rapidly increasing proportion of soft wood ties, this additional resistance to wear is becoming more essential for from their nature these softer woods are more susceptible to treatment and if they can be protected from mechanical injury, a comparatively long life can be secured.

When discussing any type of more rigid track construction, a strong difference of opinion always arises among engineers as to the point to which this rigidity and unity of motion of the rail and ties should be carried. With the common cut spike construction, the rail, tie plate and tie are all free to move more or less upon each other. With the screw spike driven down tight against the rail, nearly all this play is eliminated and the three act as a unit, greatly arresting the motion of the individual parts and thereby reducing the wear upon them. Some men do not consider it advisable to arrest this movement too closely, believing it introduces undue strains in the track structure, and even suggest that where screw spikes are used they be left with the head perhaps a quarter of an inch above the base of the rail so that a slight vertical movement of the rail will be possible without lifting the tie from its bed. In contrast with this, other engineers claim that one advantage of the screw spike is the self tamping effect which gradually brings the tie to an even, permanent bearing.



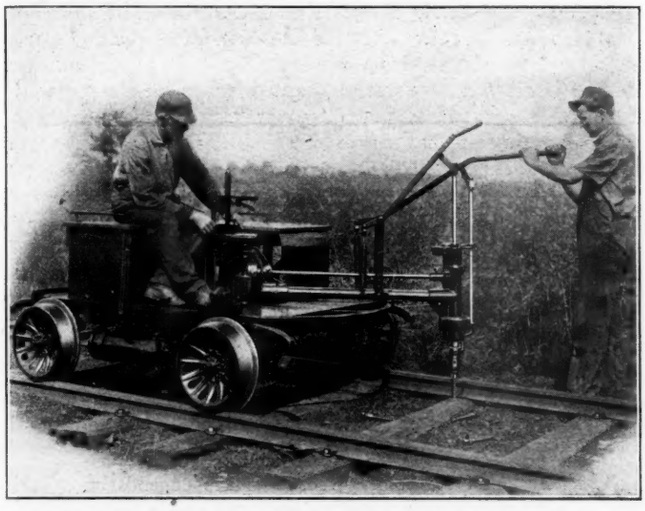
**Large Greenlee Spike Driving Car.**

### DEVELOPMENT OF THE SCREW SPIKE.

The screw spike has only come into use in this country to any extent within the past few years, but recent installations have been of sufficient magnitude to justify its serious consideration. Over 730 miles of screw spike track is now in service on 14 railways in this country, which, however, is less than in Europe where this type of construction has been used for over 50 years. The French railways were among the first to experiment with the screw spike, its use on that system beginning about 1860. They rapidly adopted it as standard, and a number of French roads have used it exclusively for the last 30 years. While the German, Austrian and Belgian railways did not favor it for some time, they have also come to use the screw spike to a large degree, and since April 1, 1899, the Prussian railways have used them exclusively for maintenance as well as new construction. The British railways, however, with the exception of the London & North Western, use iron and steel spikes without points with trenails, driving them into previously bored holes. On the London & North Western, screw spikes are used.

The Atchison, Topeka & Santa Fe was a pioneer in the use of screw spikes in the United States, having about 120

miles of screw spike track in service at the beginning of 1912. The first screw spikes on this road were inserted in 1905, 3,000 being placed in track at Rothville, Mo., nearly all of which have since been removed because of the decay of the ties. In 1908 about a half mile of screw spike track was laid in the main line a short distance east of Topeka, Kan., and in the same year 7,000 screw spikes were placed at Wyaconda, Mo. The first large installation was made late in 1910, when 55 miles of screw spike track was laid in the main line between Hutchinson and Kinsley in southwestern Kansas. The eastern 21 miles of this installation were equipped solidly with screw spikes, the ties being renewed out of face at the same time, while on the remaining 34 miles, screw spikes were placed in



**Small Greenlee Spike Driving Car with Single Spindle.**

all new ties, which were about 60 per cent. of the total. This single track line carries nearly all the heavy transcontinental freight traffic and most of the through passenger business. The following year, about 60 miles of new second track was laid in Arizona with screw spikes beside the old track which was equipped with common cut spikes, affording an opportunity for a good comparison of results under similar traffic and climatic conditions. Owing to the desire to observe the results secured from this large mileage already in, no further installation was made during the past year.

While starting somewhat later than the Santa Fe, the Delaware, Lackawanna & Western has gone into the use of screw spikes to a greater extent than any other road and has made them standard for all main line construction. During the past two years, this road has used screw spikes exclusively for all new construction and for maintenance purposes on main lines, inserting them in all new ties placed in main tracks. The Hopatcong cut-off, which was completed a year ago, was laid entirely with screw spikes, this cut-off being 28 miles long and built for two tracks with 13.5 miles of screw spikes in side tracks. At the end of 1912 over 4,000,000 screw spikes were in main track on this road, equivalent to over 330 miles of continuous track. All slip, movable point and simple switches within the limits of screw spike track are put in with the same type of construction.

The Chicago, Rock Island & Pacific is another large user of screw spikes, with about 110 miles of screw spike track now in service. Screw spikes are used with 100 lb. rail in all creosoted and soft wood ties having two or more years available service. As this weight of rail is standard for the important lines on this road, the amount of screw spike track will increase rapidly, about 50 miles being put in during the past year. About a quarter of a mile of this track has been in use on a high speed 4 deg. curve reversing on a 6 deg. curve about five years, the rest being installed during the last two years.

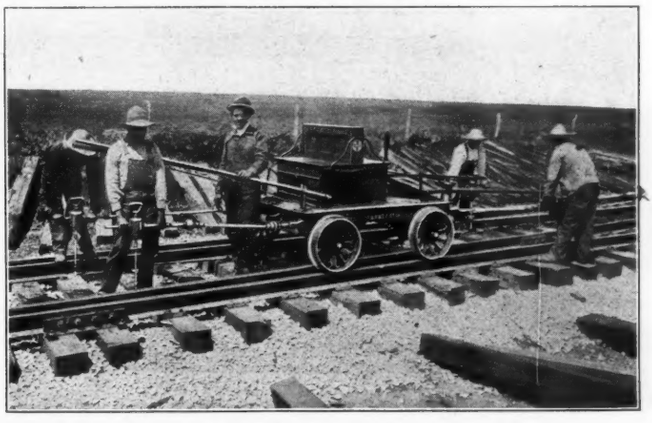
The New York, New Haven & Hartford also has a large mileage of screw spike track, over 84 miles being installed between New York and Boston. The first installation on this road consisted of one mile of track near Greenwich, Conn., which was placed in service since 1907. At the present rate of installation, it is expected that all four tracks between New York and New Haven will be entirely equipped with screw spikes within two years.

The Harriman lines have recently gone into the use of screw spikes to some extent. Six miles of screw spikes were driven in main track and 1.17 miles in side track on the Union Pacific in July, 1910. Late in 1912, 50 miles additional were installed, 25 miles on the Union Pacific and 25 miles on the Southern Pacific.

Among the other more prominent installations are those of the Pennsylvania Railroad, which has about 25 miles of screw spike track, mainly on the New York Terminal division, which has now been in service about two years; the Chicago & North Western with one mile near Janesville, Wis., placed in December, 1907; the Pennsylvania lines with 1.5 miles which has now been in service about two and one-half years in experimental track; the Erie with one mile which has been in service two years; the Baltimore & Ohio with one mile which has been in service three years; the Chicago & Eastern Illinois with one-third mile which has been in service five years; and the Northern Pacific with 5,276 screw spikes in main track near Plains, Mont., and 1,500 near Maywood, Wash., the spikes in both places being in experimental track under supervision of the United States Forest Service. In addition, screw spikes are used on bridges on the Baltimore & Ohio when ties are renewed singly or out of face, while the Nashville, Chattanooga & St. Louis has about half a mile of screw spikes in track entirely on bridges.

Believing that it is not advisable to hold the rail in close contact with the tie plate, the Pittsburgh & Lake Erie has adopted a form of track construction whereby the tie plate is made an integral part of the tie by the use of screw spikes and the rail is held in place by cut spikes driven through slots in the plate.

When using screw spikes it is essential that the tie be bored before treatment so that it will be fully treated where the



**The Au-tra-kar in Use on the Santa Fe.**

danger of exposure to moisture is the greatest. This boring at the treating plant is a development of the past two years, the first screw spikes being inserted in ties bored in place in the track. The first 18 miles of the 55 mile installation of the Santa Fe was placed in this way and all ties on the Lackawanna were bored in place for screw spikes until the completion of the new treating plant at Paterson, N. J., a year ago. This boring previous to treatment is also extending rapidly to ties used with cut spikes, and it is also becoming the general practice for the ties to be adzed before treatment in

order that the mutilation at the time of placing in the track may be reduced to a minimum.

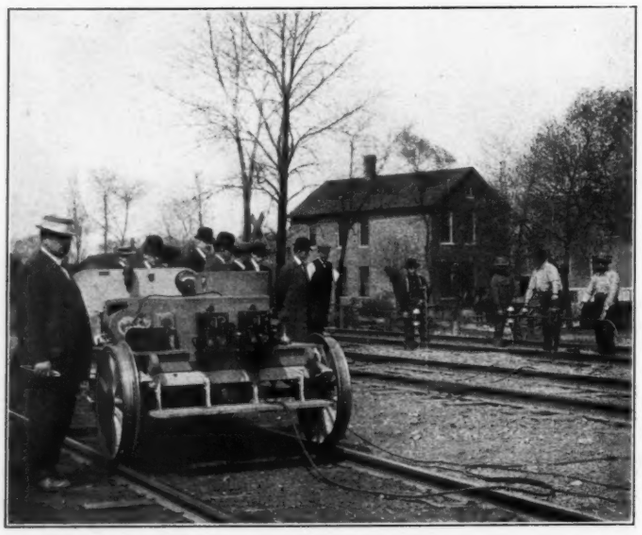
In Europe it is customary on many roads to insert hardwood dowels or plugs into the tie to receive the spike. This dowel gives a resistance to the spike equal to that of a hardwood tie and distributes the stresses transmitted to it by a spike so that they come within the limits of the crushing resistance of the softer wood. Some four or five years ago this same idea was seriously agitated in this country, and about 50,000 dowels were inserted experimentally in new ties on the Santa Fe. However, later practice has shown that it is not necessary to insert these dowels, at least during the early life of the tie, as when the wood decays about the spike the tie can then be bored and the dowel inserted at any time.

The Harriman lines have adopted a helical spring or liner for the 50 miles of track installed the past season, as shown in the accompanying drawing, this liner being inserted in the tie by means of a special mandrel at the treating plant. While this Thollier liner has been used for many years in Europe, this is the first installation of any magnitude in this country, the purpose of the liner being to provide increased resistance against crushing of the wood fibers.

### THE SCREW SPIKE TIE PLATE.

While, as a general proposition the tie plate is now widely recognized as advisable with soft wood ties, it is essential with screw spikes for it is not economical to protect the tie against spike killing without at the same time providing against rail cutting. For this reason special attention has been given to the design of the screw spike tie plate and especially to the boss supporting the head of the spike.

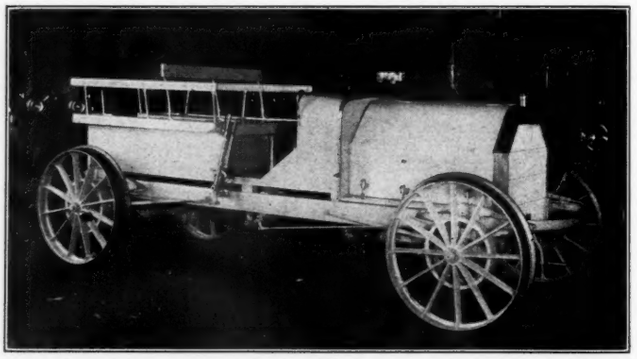
At first these spikes were used with the ordinary flat tie plates and this practice is still followed by the New Haven, whose experience has not shown the necessity of a supporting lug. However, the general experience has been that the thrust



**Early Type of Snow Car on the Rock Island Near Chicago.**

of the rail soon bends the spikes outward, making it difficult to withdraw them. In a preliminary report just issued by the Forest Service on the results evident so far in four sections of test track, the conclusion is reached that "it is desirable to have some form of boss on the plates to reinforce the heads of the spikes against lateral thrust." The design of this raised portion varies to quite an extent. The first plates were made with the support for the entire head except that portion bearing on the rail. However, this was open to the objection that any irregularity either in the plate, in the spike or in its driving would prevent the head of the spike from taking full bearing on the rail. Therefore the later plates are now generally made to support the spike at the rear of the head only. A further development has recently been brought out consisting of a ball and socket washer, with an adjustable support to fit the head of the spike. While because of their irregular section the first plates had to be cast, later designs with a simple contact as those of the Harriman lines, can be rolled.

The Lackawanna has recently changed the design of the tie plate slightly by withdrawing the inner edge of the spike hole a short distance from the shoulder line to prevent the base of the rail from cutting into the neck of the spike in case of a derailment and making it difficult to withdraw the spike. The



**Latest Type of Snow Spike Driving Car.**

Lackawanna practice also differs in that a special plate slotted for one screw spike and two cut spikes is used at the joints.

### SCREW SPIKE DRIVING APPARATUS.

The best method of driving screw spikes depends on a variety of conditions, including the density of traffic and the number of spikes to be driven. Where only a small number are placed, a hand wrench is generally used. Also, on very busy lines, such as the Lackawanna, hand wrenches are required, as it is impracticable to place any car on the track. The hand wrench is open to the objection that the spikes may not be driven uniformly. While one may be driven so as to injure the wood fiber or turn off the head, another may not be turned down far enough. Where screw spikes have worked loose, it has generally been attributed to this defect of hand driving. Hand driving is also slower and more expensive, although within the past year a ratchet wrench, shown in one of the accompanying photographs, has come upon the market.

The earliest type of power driving cars was brought out by Greenlee Brothers of Rockford, Ill., for use in laying the 55 miles of test track on the Santa Fe west of Hutchinson, Kan., in 1910. This car was similar in general design to that shown in an accompanying photograph, with the exception that it was provided with six driving spindles. This car is a double truck steel car driven by a 27 h. p. steam engine mounted on the platform and is provided with radial arm spike driving heads, permitting each spindle to reach four ties at one setting of the car. This car bored the ties for four spikes per tie and drove the spikes on a mile of track per day when laying the stretch referred to. As it was necessary for a locomotive to attend this car while working on the main line, a smaller self-propelling car with two spindles has since been built by the same company for this same road. This car is driven by a gasolene engine and is capable of running to sidings under its own power to clear trains.

Either of the above cars must run onto a side track to allow trains to pass, which causes considerable delay. For this reason there has arisen a demand for a lighter car, especially for maintenance work, which can be lifted off the track to let a train pass, and at least three different types of cars have been developed for this purpose. The Greenlee Company has built a small gasolene motor car similar to the ordinary section motor car with one spindle mounted on a pivot in the center of the car and free to

swing to either side. This spindle is provided with a combined boring and spike driving head which can be used for either purpose. It is geared to operate at the same speed as the spindles on the larger cars and can drive the spikes for 1,500 to 2,000 ft. of track per day where no boring is necessary. If the ties must be bored in place, this distance will be reduced about 40 per cent. Among the roads on which this car has been used are the Santa Fe and Southern Pacific.

The Au-Tra-Kar, made by Burton W. Mudge & Co., Chicago, is another small self-propelling car which can readily be lifted from the track. This car is provided with two boring spindles on the front end and two driving spindles on the rear end. These spindles are free to swing laterally and telescope so that three ties can be reached without moving the car. Each spindle is equipped with a friction clutch which is adjusted to slip when the spike has been driven to the desired degree of resistance, thus insuring the driving of the spikes uniformly. The driving extensions are hung on cranes which support the tools, relieving the operator of this weight. This car has been used extensively on the Santa Fe.

A small car of a somewhat different design is the Snow car, made by the T. W. Snow Construction Company, Chicago. This car differs from other types in that electric power is generated for boring the ties and driving the spikes, permitting the car to be placed on the embankment to one side, clear of the main line. Power is carried from the car to the boring and driving spindles by cables, sufficient cable being provided to enable 2,000 ft. of track to be covered from one position of the car. In this way interference with trains is reduced to a minimum, for the car is at all times clear of traffic and requires no protection. The men can work until a train is almost upon them and with a quick throw of the cable, can step to one side to allow the train to pass. The first car of this type was brought out about two years ago. A car which has just been shipped for use on the Rock Island lines in Iowa, embodies several improvements. It follows closely the lines of automobile construction in the details of its design and is provided with practically all the accessories ordinarily placed on the automobile, except the steering gear. A 40 h. p. direct connected gasolene engine is installed for propelling the car, which also drives a 7½ k. w. generator when putting in spikes. The car is supported on cast steel flanged wheels, mounted on rigid journals and is capable of developing a speed of 50 miles per hour if desired. As the engine must drive the generator while the car is standing still, four times the ordinary area of front end radiation surface was required. The generator provides power sufficient to drive three boring tools and two spike driving tools, this ratio having been found to keep all tools working continuously and give a uniform rate of progress. Fuses are provided with each individual tool, which will blow out if the tools encounter increased resistance, in this way protecting the generator. The car weighs 3,400 lbs. and can carry 12 men, although only five are required to operate it. It is capable of boring the ties and driving 550 spikes per hour.

### COMPARATIVE COSTS OF SCREW SPIKE CONSTRUCTION.

The cost of installing screw spike track is considerably more than for the ordinary construction. All the various details including the cost of the tie plates and spikes, as well as the boring and driving, add to the expense. Previous to the installation of boring machines at the treating plants, the ties were bored in the track. The early installations on the Santa Fe were placed in this manner, the 55 mile stretch in western Kansas being bored by the machine referred to above, which also drove the spikes, this boring costing about 1.25 ct. per hole. On the Delaware, Lackawanna & Western this hand work was done with a small portable tool working to template. Field boring is still necessary on this road at switch leads and other special track work. All boring of ties on the New Haven is done by hand with the common tools, although machine boring is being considered.

On the Rock Island the cost of placing two tie plates, boring four holes and driving the spikes has averaged 13.74 ct. when done by hand. This cost was reduced to 4.89 ct. per tie when using a machine with two drills and one spindle driving tool for scattered work and to 2.9 ct. per tie when using two drills and two driving tools for continuous work. The cost of preparing the ties for screw spikes, including drilling eight holes per tie, averaged about four cents per tie on construction work on the Pennsylvania Railroad while the cost of driving the screw spikes with an air drill machine averaged about 0.9 ct. per spike. The cost of driving the spikes on the New Haven averages about 0.7 ct. each; and on the Baltimore & Ohio, 1.1 ct. On the Pennsylvania lines the cost of preparing the tie, exclusive of the treatment, averaged from 5.3 ct. to 15 ct., while the cost of placing it in the track, exclusive of lining and surfacing, cost from 10.6 ct. to 19.5 ct.

While screw spikes have not been in use in sufficient quantities long enough to enable final results to be secured, some conclusions can be drawn from the small installations which have been in service for five years or more and from the more extensive stretches which have been in service for two years. The results so far secured indicate that maintenance charges will be materially reduced, especially in the items of lining and surfacing track and in tightening fastenings. Whether these savings will be reduced sufficiently to offset the increased first cost cannot be determined at the present time, although there is little doubt but that they will, on heavy traffic lines at least. It has usually been necessary to tighten the spikes about three months after driving and again after an interval of about six months, after which they require little further attention. A careful examination of the Santa Fe track in Kansas last summer failed to show any loose spikes and it was impossible to slip a steel tape between the head of the spike and the rail, although these spikes had not been tightened for a year.

The track men very frequently object to screw spikes at first because of the greater difficulty of withdrawing the spikes when making routine repairs or at times of an accident. This objection is most serious in the case of derailments or other accidents where the heads of the spikes are deformed so that a wrench cannot be placed upon them. In such cases it may be necessary to cut the spike off altogether or to square the heads with a chisel before the wrench can be used, as was necessary for a long distance on one road recently. The former method is objectionable as it prevents driving another spike in the same place. However, this very fact that the screw spike is more difficult to remove is of itself an important advantage in decreasing the damage done to the track by derailments. Opportunity has been afforded on the Lackawanna to observe the effect of derailments on this track in a number of instances, including one runaway, and it is found that the track withstands such punishment with far less injury than does cut spike track and can be gotten back into service much more readily. It has usually been possible to get in to a wreck over the existing track with few, if any, repairs, while accidents on other track frequently so tear it up that portions of it have to be rebuilt.

While more limited, the experience of the Santa Fe in this regard tends to corroborate that of the Lackawanna. In a derailment on screw spike track west of Hutchinson, Kan., in November, 1911, a freight train of 60 cars was running at a speed of about 30 miles per hour when a drawbar fell between the rails, causing two cars to derail on a fill and go down the embankment. The head trucks of the third car were derailed and ran on the ties for a distance of 10 car lengths before stopping. A large number of the heads of the screw spikes were badly dented on top, three of the spikes were badly bent and one tie plate was broken. Notwithstanding the severe lateral blows that the track sustained, it was not forced out of gage, although the track was driven out of line in two places but not sufficiently to prevent the passage of trains. With the exception of lining these places and the replacing of two or three broken ties, no other repairs were required. It is obviously impossible for a track to offer a greater resistance to derailments or other

hard usage and not at the same time offer some greater difficulties for reconstruction. The roads which have gone into this type of construction feel that the advantage gained in this regard far outweighs the disadvantage.

The principal objections to the screw spike may be summarized as: the increased first cost and the increased difficulty and cost of making repairs or renewals. On the other hand, the advantages claimed are: the securing of increased life from the ties; decreased cost of maintenance, and greater strength and stability of the track.

## ABSTRACT OF ENGINEERING ARTICLES SINCE FEBRUARY 21.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the regular weekly issues of the *Railway Age Gazette* since February 21, 1913:

Attractive Stations for Small Towns.—The Buffalo, Rochester & Pittsburgh has given careful consideration to the design of attractive stations for small towns along its lines. Two standard plans have been adopted, which are used wherever local conditions permit. An illustrated description of five of these stations was published in the issue of February 28, page 383.

The Production of Sound Rail Ingots.—A paper on "Comparative Notes on Steel Rail Rolling" by Robert W. Hunt, and one on "Piping and Segregation of Ingots and Ductility Tests" by Dr. P. H. Dudley, both of which were read before the meeting of the American Institute of Mining Engineers on February 19, were abstracted in the issue of February 28, page 390.

The Crooked River Arch Bridge.—The Oregon Trunk has built a steel arch bridge over the Crooked river canyon which has a number of unusual features. The extreme depth of the canyon made its erection difficult and its design is such that it acts as a two-hinged arch for live load and three-hinged arch for dead load. This bridge was described and illustrated in the issue of February 28, page 394.

Grand Trunk Terminal at Ottawa, Ont.—An attractive station and hotel building have been recently completed by the Grand Trunk near the center of the city of Ottawa. An illustrated description of these buildings is published in the issue of March 7, page 435.

An editorial commenting on the policy of Canadian roads in operating hotels and eating houses as compared with the practice in this country, was published in the same issue, page 420.

## SOUTHERN PACIFIC ANNUAL TRACK INSPECTION.

The Southern Pacific has just issued a booklet containing the results of the annual inspection of track and structures for 1912, and the names of the winners of the various prizes. For the purposes of this inspection, the Southern Pacific system is divided into three grand districts known as the northern, southern and central districts. The assistant chief engineer in charge of the maintenance department acts as inspector over all lines. The general superintendent, district engineer and the division superintendents and division engineers also assist in this inspection on the grand district on which they are located, no division superintendent or division engineer, however, taking part in the inspection on his own division. In addition to the track, the stations, pump houses, fuel oil plants and power plants are also inspected and rated. This inspection was started on September 23, and was concluded on December 12, 1912, requiring 34 days, and covering 6,630 miles of line.

As a result of this inspection, the Salt Lake division, T. F. Rowlands, division superintendent, was awarded the highest rating of 94.1; the Oakland district of the western division, L. Bulger, roadmaster, was pronounced the best roadmaster's district, with a rating of 95.5, and Section 19 of this same district, P. A. Devine, foreman, received the highest section rating on the Pacific system with a score of 99.1. A gold medal was awarded the roadmaster with the best district and the section foreman with the best section, while silver medals were awarded to 45 section foremen having the best sections on the various roadmasters' districts. Silver medals were also awarded to 32 agents having perfect stations, to 27 pumpers having perfect pump houses, to eight pumpers having perfect fuel oil plants and to nine engineers with perfect power plants.

## FOREMEN'S MEETINGS TO DISCUSS ACCIDENTS.*

By Earl Barton,
Section Foreman, Chicago & North Western, Huron, S. D.

I have been a member of the Dakota division safety committee for the past 18 months, and I believe if every section foreman had the same opportunity to attend these meetings there would be a surprising decrease in the number of small accidents. While it is impossible for all section foremen to be members of a division safety committee, there should be some way to bring them face to face with the accidents which are occurring every day in the maintenance of way department. I think roadmasters could accomplish good results by calling a meeting of their section foremen every six months, probably just before spring work commences and just before the track freezes up in the fall. The roadmasters should act as chairmen of the meetings, and have a record of the accidents which had occurred on the division during the preceding six months. Each accident should be thoroughly discussed and the foremen should have the privilege of expressing their opinions as to the best way to prevent these accidents. After the accidents had been thoroughly discussed each foreman should be called upon to bring up for discussion any dangerous conditions which he thinks might cause an accident. The remainder of the day should be spent in talking over the safest and most efficient way of handling the season's work with foreign laborers. By conducting the meeting in this way the new foreman would derive much benefit from the experience of the older foremen.

I find when loading and unloading ties with a mixed gang of experienced and inexperienced men that when two men are required to handle one tie by working an experienced man with an inexperienced one we have less men injured. Also, in terminal yards where there is a large amount of rail to be handled, it is much safer to build skids on a level with a flat car for storing emergency and scrap rail. By using two short rails for sliding the rails on and off the cars, there is no chance for a man to be injured and there is no heavy lifting. A skid should be built for each weight of rail handled and one for scrap.

I have one man whose duty it is to take care of the switch lights and foot blocking in switches, frogs and guard rails. This man goes over the switches the first thing in the morning and repairs any defective blocks he finds. The foreman should accompany him as often as possible on this inspection tour. A good man should be chosen for this work who can be trusted. I have had very little trouble with my blocking and lights since adopting this system, and they are in a safe condition at all times.

The track at the ends of bridges should have a wide shoulder. The runway to handcar houses should be filled in level with the top of the plank so there will be no chance for switchmen and trainmen falling over them. Foremen should be very careful in regard to using bad order tools. A great many employees are injured from the use of defective tools. It is much easier to have such a tool fixed than to explain why you were using it. Roadmasters should make frequent inspections of the tools used by their foremen. Never trust a piece of work of a dangerous nature to someone else when it is possible for you to attend to it yourself.

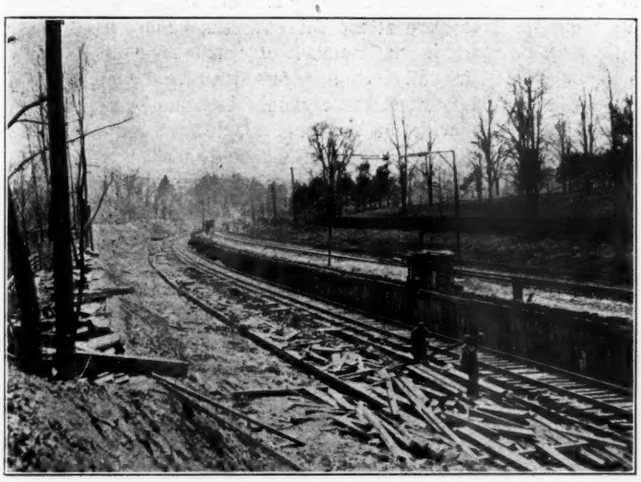
New Line for Spain.—A company has been formed for the construction and operation of a strategic railway from Malaga to Algeciras and Cadiz, Spain. The cost of construction of this line is estimated at about $8,640,000.

*Received in the Safety contest, which closed October 25, 1912.

# THIRD AND FOURTH TRACK CONSTRUCTION.

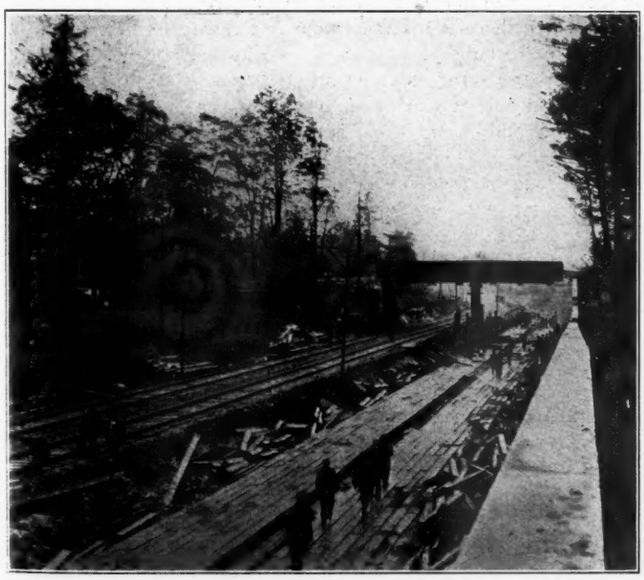
**Geological and Traffic Conditions Created Unusual Problems on New York Central Between Albany and New York.**

The New York Central & Hudson River has been carrying on the construction of third and fourth tracks between Albany and New York for the past three or four years. Because of the location of this line on the east bank of the Hudson river where the high bluffs approach very close to the water's edge,



**Building New Tracks on Trestles North of Staatsburg.**

this work has necessarily been very difficult and expensive, especially since the alinement is being improved at many points by the elimination of curves and at other places by reductions in the degree of curvature. The existing two tracks have been



**Deck of Trestle in Staatsburg Cut.**

very badly congested for some time as a very heavy passenger business, nearly all of which consists of important fast trains, is handled in addition to a heavy freight movement. There are 43 scheduled passenger trains and an average of 30 freight trains daily. The natural conditions combined with this heavy traffic make progress on this work slow and render necessary the taking of many precautions to prevent interference to traffic.

As the conditions met in all the work on this road between New York and Albany are largely similar, a description of the problems encountered on the 11 miles between Staatsburg and Barrytown, which is now being completed, will be in a general way typical.

The geological conditions in this vicinity are very interesting and are to a large extent responsible for the difficulties encountered. The rock on both sides of the Hudson river is of a very uncertain character and rather than being regular, there exists a very uniform lack of regularity. Lying nearly in the region of the Appalachian upfolding, this rock has been distorted and twisted greatly until it is now very badly broken and is inclined at all angles and in all directions. As a result the rock is rotten in the extreme and is full of pockets of clay and quicksand which are encountered most unexpectedly. In

**Rock Face in Front of Soft Material.**

some places the rock slopes sharply towards the river with a bed of silt or clay clinging to it on which the roadbed must rest. Again it may incline away from the river and contain pockets of quicksand forming sink holes over which the track must be laid. In some instances the rock is nearly vertical and a slight movement will dislodge large masses which may descend on the tracks.

No records are available regarding the difficulties encountered in building the original road, and later the second track, but they were probably small compared with those recently encountered, as the early roadbed was narrow and the undisturbed

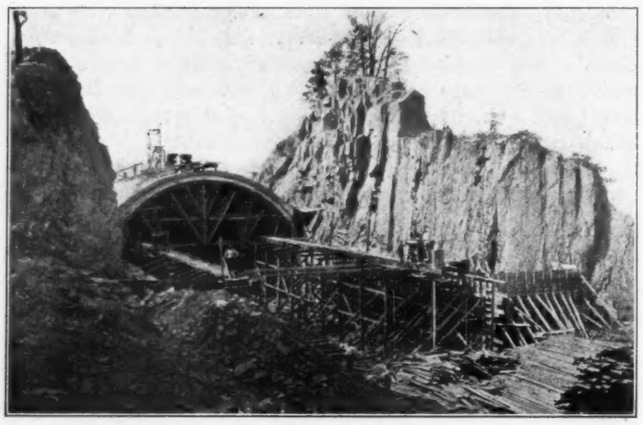
**Completed Slope Showing No Indication of Rock Face in Original Cut.**

portions of the foundation material were sufficiently stable to support the loads and maintain equilibrium.

Many of the sink holes are short, with rock cuts at either end; this condition of itself introducing serious complications

in maintaining smooth riding track under high speed trains. In one instance a ledge of rock projects under one rail while the other rail is supported on a bed of mud, necessitating in itself, very careful maintenance.

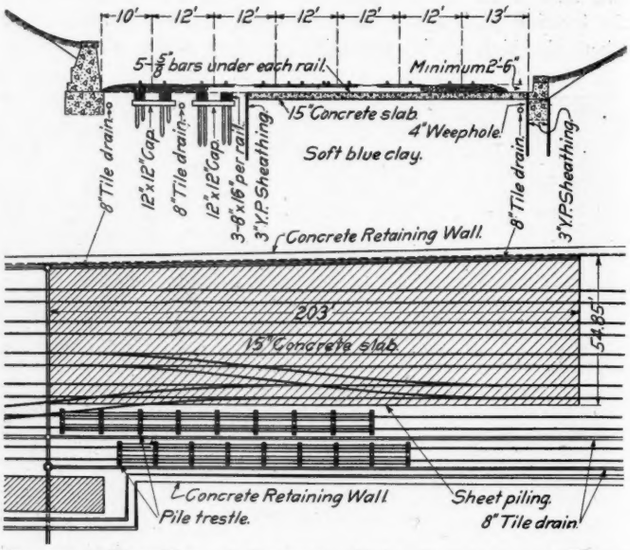
In the vicinity of Staatsburg a number of these sink holes were encountered. At one point there existed a peat pocket 300 ft. long and 10 ft. deep resting on rock. Sheet piling was driven adjacent to the main track, the bed excavated under the new tracks and the hole backfilled with rock on which the new tracks were laid. At another point where similar material was encountered, but to a greater depth, sheet piling was driven between the new and old tracks to prevent the flow of material from under these tracks. Piles were driven and capped under the new tracks and a solid floor of 12 in. x 12 in. stringers laid lengthwise with the tracks, on which the ties and track structure were placed. As the ground water level is practically at the surface, it is expected that this construction will be protected from decay for some time to come. The accompanying photographs show details of the work at this point.



**North Portal of the Astor Tunnel Showing Centering and Concrete Mixing Equipment.**

As is to be expected under these circumstances, much settlement is encountered on fills and large mud waves frequently appear. These conditions interfered greatly with the estimates of material and made impossible the balancing of quantities with any degree of accuracy. One interesting fact noted is that the settlement has uniformly been greater where the new tracks have been placed on the land side of the old fills than when on the river side.

Near Rhinecliff, where a cut was to be widened for additional tracks on the land side, the face of the cut gave every indication of solid rock, and plans were made to excavate accordingly. When construction began it was found that this rock was but a surface shell a few feet thick and that back of it there was a pocket of very unstable material. When this was discovered, plans for the handling of work had to be changed immediately and additional right of way secured to provide for the increased slopes. One of the accompanying photographs shows this condition when the steam shovel was uncovering the softer material behind the rock.




**Plan and Elevation of Concrete Slabs Required in Poughkeepsie Cuts.**

Owing to the close proximity of the old line, extreme care was necessary at all times when blasting rock. This was especially necessary because of the character of the material. Many times the effect of comparatively light shots was felt on the back of a ledge of rock at a distance from the point where work was being done; in some instances this effect being noticed at 20 ft. through apparently solid rock resulting in dislodging large pieces. In other instances large quantities have been removed by comparatively light charges because of the opening

**Beginning Excavation for the New Astor Tunnel.**

of numerous seams that were not known to exist. The rock crumbled readily when blasted so that nearly all of it could be removed by the steam shovel. This uncertain character of the rock made necessary constant inspection day and night to insure protection against detached pieces of rock being jarred loose and falling on the main tracks.

At several places the present line tunnels through points of rock extending into the river. In connection with the construction of additional tracks, these tunnels are in several instances being replaced with open cuts. At such places great care must be taken to prevent the rock from falling on the tracks, especially as much of the rock in the tunnel roofs is badly eaten by locomotive gases.

At the John Jacob Astor estate, two miles north of Rhinecliff, previous agreement required the maintenance of a tunnel. As the alinement was changed somewhat at this point, the new tunnel was built independent of the old line. By agreement with the Astor estate, the contractor was permitted to excavate an open cut, construct the tunnel in the open and then cover it, restoring the original surface. The accompanying photographs show this feature clearly. The tunnel consists of a flat concrete arch with a span of 58 ft. 1 in. and a maximum rise of 35 ft. above the top of rail.

The presence of large estates bordering the tracks with riparian rights extending to the river required, in many instances, special precautions to maintain slopes and to prevent injury to trees, etc. In several instances where bridges were raised and new embankments built, walled pits were left in the slopes about the trees.

Where the new tracks were built on the river side, less difficulty was encountered, although it was only possible to build on this side at certain places because of the great depth of the water. While the river is not wide enough for the wind to create waves of any magnitude, a number of fast steamers run on the river and create waves of considerable size which do damage to unprotected banks. For this reason, all new embankments were protected with riprap. A dry wall was first built at the toe of the slope of heavy stone brought from building excavations at New York and placed with derricks. Some of the filling material required inside of this wall was also brought up from New York on scows; the contractors securing it from building excavations there.

The track crosses a number of tidal bights where provision must be made for the passage of considerable quantities of water every 12 hours. Openings were made at these places, either by culverts or short bridges. Cast iron pipe and concrete boxes were used for the smaller openings while the bridges were built of I beams embedded in concrete and resting on concrete abutments.

A very interesting problem was encountered in Poughkeepsie where similar work is under way. While some difficulty had been experienced in holding the tracks to surface in several places, no unusual difficulties were anticipated. However, when the widening of the cuts was undertaken, trouble was suddenly encountered in holding the new tracks up. In two different instances these tracks were left in good condition in the evening and showed no signs of weakness under heavy traffic during the early portion of the night; however, towards morning they suddenly dropped, creating such a condition that traffic could only move over them with great care. In order to insure continuous operation, it became necessary to drive piling under these tracks the length of these pockets and build standard trestle construction. A wall of sheet piling was then driven between these and the adjacent tracks to prevent any movement of material and the material under the remaining tracks was then excavated. Following this a concrete slab was laid under the remaining tracks the entire length of the sink holes, resting directly on the mud, and designed to confine this material as well as to distribute the load. The results so far, indicate that this has been successful. This construction was required in three instances at Poughkeepsie. The length of concrete mats required ranged from 90 ft. to 910 ft., and they extended under four and five tracks.

This construction work was all handled under the direction of G. W. Kittredge, chief engineer; J. W. Pfau, engineer of construction, and R. E. Dougherty, district engineer, with George D. Evans, assistant district engineer, directly in charge.

## ORGANIZATION OF FLOATING GANG TO TRAIN FOREMEN.*

By W. H. CLEVELAND,
Roadmaster, Atchison, Topeka & Santa Fe, Wellington, Kan.

A school for section men is often advocated in its various phases. One of the popular ideas is monthly meetings, held at some point on each division. This is good as far as it goes, but it merely provides for an exchange of ideas and explanations and social friendship. The only way that proficiency can be gained is by actual experience; by being brought in actual contact with the work, in all its varying conditions; by working under the supervision of some one who is master of the art. There must also be some object in view, something in sight to work for. There must be, first, present means of support, second, assurance of future promotion.

To provide a supply of competent foremen for the future, I would recommend the systematic organization of floating gangs. On each superintendent's division organize one small floating gang as large as the working conditions of the division will permit. Let this gang consist of from six to ten laborers. Let the men employed in this gang be selected from the ranks of American labor, of the proper age and of the highest intelligence that it is possible to obtain. Pay them wages as much above those of the foreign labor as the division conditions will warrant, taking into consideration, the wages paid locally to labor in other industries, and let them understand that they are in line for promotion as their experience and proficiency warrant. Place the most experienced foreman you have over this gang; a man who is master of the profession in all its features; a man whose qualifications place him in line for promotion to the position of roadmaster. Pay him the extra gang foreman's salary and let him understand that his business is to do a high standard of work, supervise all work, and act as instructor of the men under him, to fit them for positions as foremen. Place this gang in good comfortable bunk cars with a boarding car for the men, so that they will always be at home with the outfit. Let the foreman board the men. Equip them with the necessary tools for doing all kinds of work, including emergency work—wrecks, washouts, etc. Furnish them with standard blue prints and rules and literature. Then use this gang on any part of the division where it is needed. If there are switches to be laid or improvements of any kind to be made on any section, move this gang there and let it do the work in connection with the regular section gang, schooling the men in the art of switch laying and track laying to standard. In this manner the regular section gangs will get the schooling and instruction which will greatly benefit them. Make it the duty of the instructing foreman thoroughly to instruct each foreman and gang on whose territory he is working and make some part of every Sunday an information day for this gang and the foremen and men near where he happens to be stationed. Once a month let the roadmaster be present and make it a general instruction meeting, taking up the matters of timebooks and reports, book of rules, time cards, blue prints and estimates, and the subject of emergencies. In this way the entire division will soon become thoroughly informed on all subjects and will be experienced in all standard and emergency work. Then when you want a relief or permanent foreman you can promote a high class man from this gang and immediately fill his place in the gang with a new man. If you want a relief or permanent

*Received in the contest on The Foreman Problem, which closed March 25, 1912.

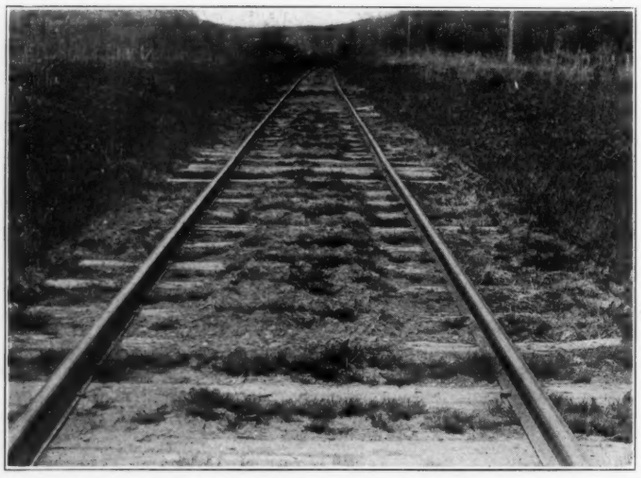
roadmaster on quick notice promote the foreman of this gang and you will have a man that is qualified and acquainted with all parts of the division and its working conditions, and one of the best laborers in the gang can be promoted to relieve the foreman in his absence.

When there is no track laying or important work to be done, let this gang help out with the ordinary work on the division. If there is a small piece of ballasting to be done; if there are the renewals; if there is fence to be repaired, or new fence to build, use them for such work; and if there is no special work to do, then float them from one section to another, helping out the worst sections.

If at any time forces are short and a section foreman has a mile or two of rough track that he cannot reach in good time, then float this gang over to him and let them help him out a week or so and then pass them to the next section needing help. This will save the necessity of increasing forces and will permit division operation with much less force. In case of accidents, wrecks, washouts, and such emergencies, this gang in cars can be gotten on the ground quickly and their experience should make them very valuable. Any division can find continual work for such a gang, unless it is in severe winter weather, and the arrangement will insure a supply of foremen of a high class without gathering the foremen monthly to some fixed point on the division, which depletes a large portion of the division of foremen for one day and does not instruct the section laborer from whose ranks the foremen must be taken.

## KILLING WEEDS WITH CHEMICALS.

The weeding of track, especially in dirt ballast, is a source of heavy annual expense to the railways. As the weeds offer serious impediment to trains if allowed to grow undisturbed, it is necessary that they be removed. The most common method of removal is by hand weeding with hoes or similar tools. On some of the western roads, weed burners are also used. Another method which has gained wide attention during the past

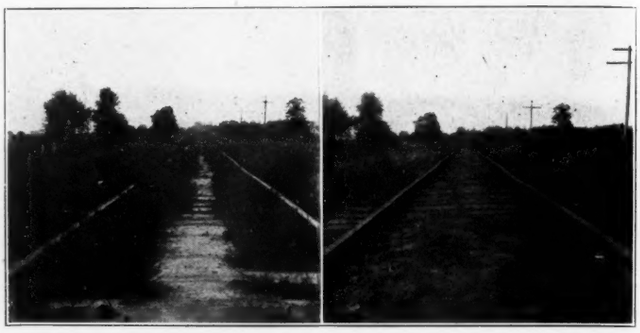


**C. M. & St. P. Track, near Dunnville, Wis., Treated July 26, 1911. Photo Taken May 16, 1912.**

two years is that of the destruction of weeds by the use of a chemical.

During the past two seasons the Atlas "A" weed killer has been used to such an extent that a definite comparison of results can now be secured. This material is a concentrated chemical solution weighing about 13.5 lbs. per gal. It is dark gray in color, with an odor similar to that of lye. Before applying, this liquid is diluted with water in the ratio of about 15 to 20 gal. of water to one of the chemical, the water serving simply as a means of distribution of the chemical. In general, about 10 gal. of the chemical is required for each one foot width of track one mile long, although this varies somewhat with the density of the weed growth, the nature of the ballast and soil, and the season in which it is applied. After the first year's application this amount can be reduced until the fourth or fifth year, when it is stated that the ground will be practically sterile and will support very little vegetation.

Where it has been tried it has generally been used in sufficient quantities to warrant the equipping of a tank car with a sprinkling device whereby the diluted liquid is distributed over the



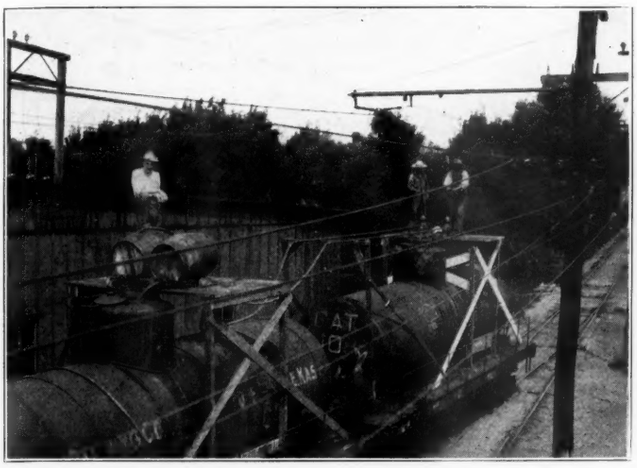
**Photographs of B. & O. Track on Shawneetown Branch Before and Eight Weeks After Treatment. Heavy Growth of Warren Weed Originally.**

track. However, a small tank can be installed on a push car if desired and the material sprayed from that. Where a large car is used a spraying device consisting of a perforated pipe about 2½ in. by 8 ft. long is attached to the discharge pipe so that it is held about 8 in. above the rails. This pipe is drilled from end to end with three or four rows of 3/16 in. holes. Elbows are placed in each end of the pipe with the closed end turned up, the elbows being drilled with a number of holes located so as to throw the chemical out the required distance beyond the ends of the ties. The amount of flow can be regulated by a valve in the discharge pipe, which can be operated from the platform of the car. The chemical and the water are mixed by pumping air through the train air line into the bottom of the tank to agitate the solution. This same air line can be used to maintain a pressure in the tank while spraying is being done.

The applications should be made in a dry spell when the plants are thirsty and will quickly absorb the moisture. For this reason it is not advisable to apply the solution after a heavy rain when the plants are saturated. While the material may be applied at any time during the growing season, best results can be secured by using it early in the season before the vegetation has reached the stage where it will remain standing after being killed, for not only is it more sensitive and more easily killed early in the year, but no unsightly stalks are left standing. The chemical is poisonous and care is required to see that it is not used along the right of way where stock is grazing, for when the vegetation is moist it tends to attract cattle and kills them. However, a recent improvement has been made whereby it is said that this chemical has been made distasteful to stock so that they leave it alone. This has recently been tried on the Cuban railways where, due to the lack of dining car facilities, venders sell eatables at the various stations and much refuse is thrown from the windows of the trains, attracting pigs, goats and other animals. The use of this improved chemical has not only resulted in killing the vegetation but also in repelling the live stock.

While the cost of this material varies somewhat with the amount of the chemical used, it averages about $35 to $45 per mile of track for the first application and a lesser amount for succeeding years. As the cost of weeding ordinary dirt ballast track ranges from $30 to $50, the economy is evident, while the section forces are enabled to devote their time to more productive work.

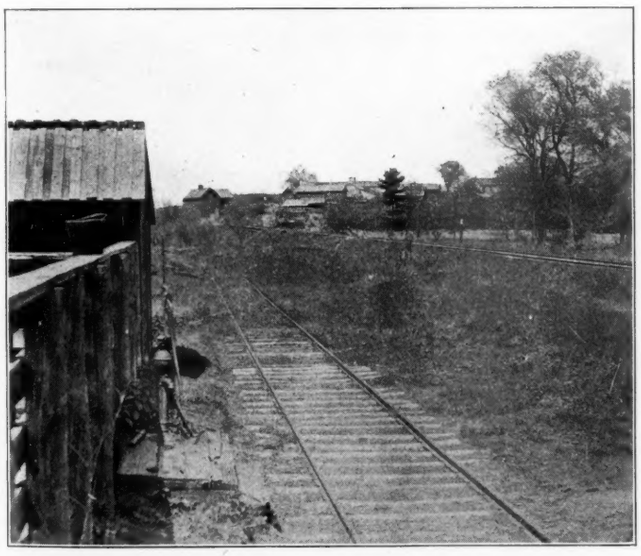
While this product has been used extensively in South America, Australia and other foreign countries, it has only been used here for the past two years. One of the first roads in this country to use it to any extent was the Chicago, Milwaukee & St. Paul, which treated 16 miles of track in northern Wisconsin in July, 1911, with an average of 62.5 gal. per mile at a cost, including the expense of the train crew, of $26.23 per mile. This



**Removing Chemical from Supply Car to Spraying Car on Fort Dodge, Des Moines & Southern.**

track was sprayed by means of a sprinkling apparatus attached to an old tank car. The track was not ballasted and was covered with sod. About 24 hours after the application was made the vegetation had wilted, and this year there was no trouble with weeds or grass.

The Baltimore & Ohio treated 36 miles of earth ballasted roadbed between Flora, Ill., and Shawneetown during the past summer. The vegetation on this line varied from a light growth of



**Treated and Untreated Track on C. M. & St. P. at Downsville, Wis. Treated July 26, 1911. Photo Taken May 16, 1912.**

grass to a heavy massed growth of foxtail and crab grass interspersed at various places with berry vine, milkweed and a very heavy growth of Warren weed. Due to continued wet weather in the spring the application of the weed killer was not made until the middle of July, at which time a width of 12 ft. was treated with 100 gal. of the chemical per mile. Within three days after the application was made most of the weeds began to die and the effect was very noticeable. The difference after an interval of eight weeks is shown in one of the accompanying photographs. The Warren weed was entirely killed while the foxtail and crab grass were very largely, although not entirely, destroyed—the application not being heavy enough to permeate entirely the thick mass of roots. This application was made at a total cost of $37.65 per mile, exclusive of $29.32 for equipping the car with a sprinkling device.

Forty miles of track of the Fort Dodge, Des Moines & Southern was treated in the same manner, this track being ballasted with gravel in which a considerable amount of soil which would support vegetation was mixed. Due to various delays, this track was not treated until quite late in the season after the weeds had made a strong start. However, with the exception of a few spots where wiry grass was present, the weeds were thoroughly killed.

The Pennsylvania Railroad applied this material at different points on the Delaware and Manhattan divisions during the last season. The mixture was prepared in the ratio of one gal. of the chemical to from 15 to 40 gal. of water, depending on the density of the weed growth. It was applied both with hand sprinkling cans and from cars carrying tanks connected to small pumps operated by air from a locomotive. The time required for applying it varied from about 30 min. for a train equipped with tanks to go over two miles of single track to 250 hours for sprinkling three tracks for a length of 1,850 ft. by hand. Among other roads which have also used this material for killing weeds is the Public Service Railway of New Jersey, which treated 65 miles of track during the past year.

## PREVENTION OF ACCIDENTS TO MAINTENANCE OF WAY EMPLOYEES.*

BY W. E. DAVIN,
Supervisor, Pittsburgh & Lake Erie, McKees Rocks, Pa.

According to my observation a large number of accidents to employees in the maintenance of way department is due to dangerous practices and to the carelessness of the employees themselves. On many roads safety committees have been appointed and representatives from all of the various departments act on these committees and report in accordance with the policies outlined. In the work of the safety committees it would seem that nearly all of the efforts are directed toward the prevention of accidents to trainmen and shopmen, and comparatively little is being done by these committees toward the prevention of accidents to employees in the maintenance of way department. This lack of interest may be due to the failure of the supervisors, roadmasters and foremen who are actually in charge of the men and work in the field, and who have every opportunity to observe the conditions and practices that are causing accidents to employees in this department, to give this matter serious consideration.

Every supervisor, roadmaster and foreman, whether a member of a safety committee or not, should consider it his duty to give attention to all matters pertaining to the safety of the men employed under him. In addition to this all conditions that may seem dangerous or that might cause injury to trainmen or others should not be overlooked but should be reported to the proper officers. The primary work, however, of those in charge of maintenance should be to remedy defective and dangerous practices and conditions in the department which they represent. In this respect I have done a great deal of work on my division, taking up each case separately and applying a remedy wherever possible to prevent a recurrence and to eliminate the dangerous features and practices.

When employees in this department are injured report is made to the proper officers. The supervisor makes a thorough investigation and determines as far as possible the cause, and if it is found that the accident could have been avoided by some other

*Received in the Safety contest, which closed October 25, 1912.

method or practice or by the use of other or better tools, a circular letter is sent to all foremen calling attention to this particular accident, how it occurred, the extent of the injury, and explaining in detail how it might have been avoided together with instructions to the foremen to explain the details to each man in his gang. Where foreigners are employed who cannot understand English, one of the foreigners in the gang explains to them the instructions in their own language.

Many dangerous methods are in use by trackmen in performing track construction and repair work and in handling tools. Many of these methods may have been used for years and have caused numbers of accidents. In order to bring these matters before the men in a practical manner special instructions are issued from time to time explaining the dangerous features and methods of handling work and tools and how to avoid injury from them.

Lack of system and bad practice are responsible for many injuries. When handling rails a good man at each end of the rail with a rail fork and the rest of the gang giving attention to these men is a safe method. The men at the ends of the rail should be competent. Rail forks are used when loading and unloading rail. Tongs are always used when handling and carrying rails. With the majority of foreigners it is common practice to do considerable talking. When performing hazardous work we aim to stop this as much as possible.

Rail cutters or chisels are kept in good repair. Battered head cutters are not used. It is just as important to keep the striking face of a cutter in repair for safety as it is to keep the cutting edge in repair for cutting. The use of spike mauls for striking chisels is not permitted. Striking hammers or sledges with wide striking faces are used. When cutting rails the practice of lifting the rail as high as the men can reach and allowing it to drop across a tie or rail is not permitted. The use of a rail bender is perfectly satisfactory.

Holding a spike maul on the head of a spike and striking it with another maul is a dangerous practice and is not permitted, a rail punch being used instead. Many injuries are due to the head flying off when pulling spikes and from pieces of steel flying from the bar and spike maul. If the spike is first tapped with the spike maul it will not be necessary to drive the bar under the spike head with a maul.

Track jacks are dangerous to operate and the most competent man in the gang is always assigned to this work. The use of tie tongs for handling ties not only prevents injury to the men but is a great saving to the ties compared with the old practice of handling them with picks. When trackmen are working at interlocked switches, in addition to a proper arrangement with the towerman, a block is placed in the points to prevent men from being caught in case the lever is accidentally thrown by the towerman. The use of a megaphone is of much assistance in handling men in busy yards and terminals and at points where the view of approaching trains is obstructed. Cutting or breaking track bolts out of joints has caused many accidents. If bolts must be cut out one should see that all other men in the gang are out of the reach of any parts that may fly from the bolt or cutter.

Jumping on and off moving cars and trains, crawling under cars, climbing over cars in yards, passing between cars standing close together, taking shelter from rain under cars, sitting under cars to eat lunch, getting on and off hand and push cars in motion, running hand and push cars or motor cars over interlocking switches without a clear understanding with the towerman, applying brakes on hand and motor cars without warning to the men on the car, allowing the men to leave track tools on or near track, standing, walking or working on tracks while trains are passing on adjacent tracks, riding on or standing close to a plow when unloading ballast or other material, standing near cables when ploughing off cars, sitting on brake wheels of cars at any time, thawing, handling or transporting dynamite or other high explosives, running hand cars and motor cars at a high rate of speed and too close together and standing close to track when trains are passing are some of the many acts of carelessness on part of employees which result in accidents and injury and to which we have given special attention.

Foreigners are the victims of many acts of carelessness and poor judgment on the part of the gang foreman who does not stop to think of the results that follow. They are easily confused and foremen should use more than ordinary care to keep them out of the way of trains.

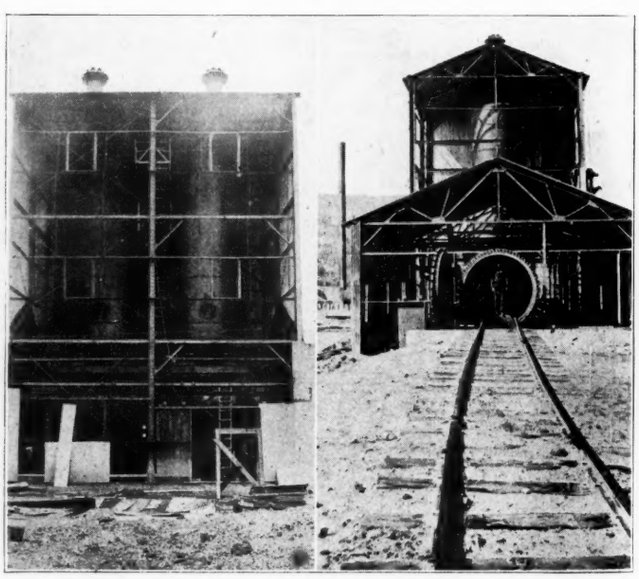
When working on double tracks and four tracks at busy terminals trackmen can do much to prevent injury to employees in the transportation department by keeping the work cleaned up every day wherever it is possible to do so. When work is in progress that cannot be put in safe condition daily, a notice should be placed on the bulletin boards for protection of trainmen.

The unloading and piling of material at a safe distance from tracks is a very important matter that trackmen must strictly comply with. The use of improved machinery and tools for handling materials in connection with maintenance of way work has proven a large factor in decreasing the number of accidents and also in decreasing the cost of labor.

## CREOSOTING PLANT NEAR CONNELLSVILLE, PA.

The creosoting plant of the Pittsburgh Wood Preserving Company, Pittsburgh, Pa., has just completed its first year in operation, which has proved thoroughly successful. This plant is located on the tracks of the Pittsburgh & Lake Erie and near those of the Baltimore & Ohio, the Western Maryland and the Pennsylvania at Broadford Junction, Pa., near Connellsville. The site includes 50 acres of property near the Youghiogheny river, on the hill side of the tracks, where good drainage is secured.

Beech, birch, maple, red oak, white oak and chestnut ties, red



Overhead Creosote Weighing Tanks. End View of Cylinder House Under Construction.

oak piling and yellow pine structural timbers have all been treated and the plant caters to the commercial business throughout the Pittsburgh district. Last summer extensive tests were made of actual treatment with the empty cell process, and it was found that a thorough penetration of all sap wood could be secured in the above named species by a careful treatment of the seasoned wood. All ties at this plant are

seasoned in the yard from six months to over one year before treatment.

The main buildings are located at the extreme end of the property and away from the main ladder track. The loading platform is between the ladder track and the cylinder house, and is 4 ft. high with tracks on each side spaced 44 ft. center to center. On top of this loading platform there are three 36 in. gage tracks. Between the cylinder house and the loading platform is located a standard 50 ft. track scale arranged for weighing all charges in and out of the treating cylinders. The main ladder track is constructed of 80 lb. rails throughout, and all storage tracks are three rail, 36 in. and standard gage, for handling the narrow gage trams and locomotive. An electric hoist is used to handle treated ties in the yard.

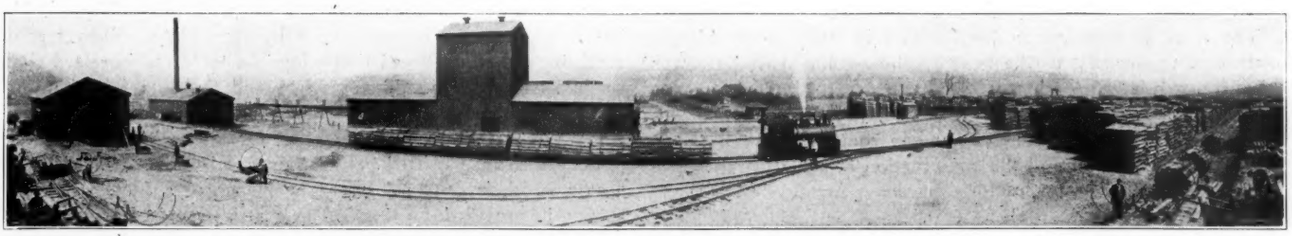
The treating plant consists of two 7 ft. cylinders, each arranged for a capacity of about 500,000 ties per year. The cylinders are set on concrete piers so that a man can walk under and around them. There are two special high pressure measuring, or working, tanks which are mounted on scales above the cylinders. Each tank will hold about 75 tons of creosote and, with the special arrangement, it is possible to weigh this heavy load within the graduations of 20 lbs. on the scale beam or, if further refinement and accuracy is wanted, the scales on the loading platform can be used as a check. Thus all creosote used is weighed in and out of the cylinders, and it is possible to secure very accurate results. The cylinder house is equipped with special rotary vacuum pump, air compressor, pressure pump, general service pump and circulation pump for the Card process. At one end of the building a room is partitioned off for the generator.

The boiler house is located about 125 ft. from the main building, and is arranged for two 150 h. p. boilers. The 40,000 lb. Porter yard locomotive is also housed here. The steam line from the boiler house to the main building and the exhaust line are carried overhead on steel supports.

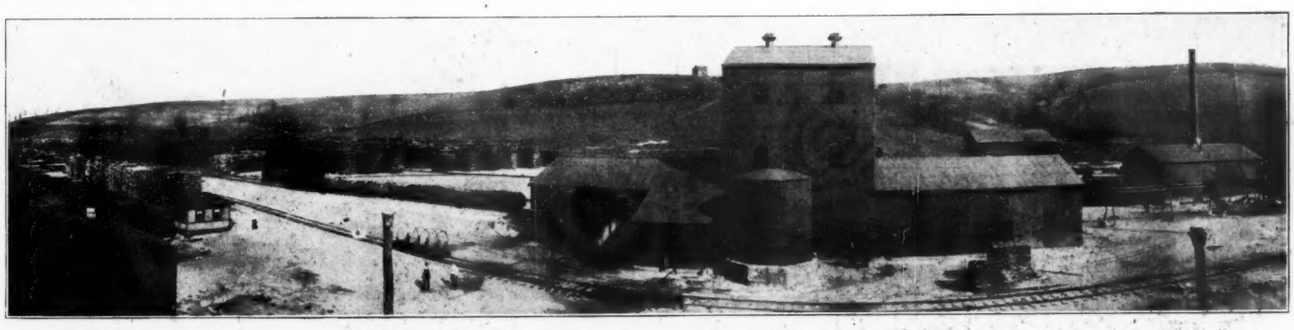
An adzing plant is provided where all ties are faced to suit the tie plate and bored for screw spikes, before treatment. On the feed end of the adzing machine there is an automatic dumping arrangement which drops the ties from the trams onto the table which feeds the adzing machine. The tram cars drop down by gravity through a spring switch to the opposite end of the machine, ready for reloading. This adzing machine is driven by a 70 h. p. engine located in the same building. Adjacent to this adzing machine there is located a block cutting machine for the manufacture of blocks for shop floors and bridges.

For storing the creosote at this plant there are three very large storage tanks, sufficient for a year's supply of creosote. The creosote arrives in tank cars, and is dropped by gravity into the underground unloading tank, from which it is pumped to either of the three storage tanks.

Most of the railroad work at this plant is treated under the supervision of Dr. Herman von Schrenk, and the plant is managed by Grant B. Shipley of the Pittsburgh Wood Preserving Company.



**Adzing Plant, Boiler House, Cylinder House and Storage Yard at Connellsville Creosoting Plant.**



**Panorama of Connellsville Plant with Cylinder House in Foreground.**

## PROTECTION OF RAILWAY EMBANKMENT AGAINST STORMS.

The main line of the Louisville & Nashville between New Orleans and Mobile is located along the northerly shore of the Gulf of Mexico for many miles, and is subject to occasional damage from the storms which move inland from the Gulf. These storms are not unusual in the spring and fall, but seldom do much damage, lasting for only a short time. However, occasionally there comes a storm of greater violence which may continue for several days, doing much damage to the track and to property of all kinds. Such a storm occurred about two years ago, damaging the track for many miles and putting it entirely out of commission for a number of days. To avoid the repetition of such trouble this portion of the track had been rebuilt and anchored so that it is now believed that it will safely withstand further storms. This reconstruction work is now practically completed.

The elevation of the subgrade of the new embankment has been established 6.5 ft. above the level of mean tide and it was made 22 ft. wide at the top and 48 ft. wide at the bottom. The center of the embankment is composed mainly of sand, which will facilitate drainage and the shoulders have been built of a tough, cohesive material, proof against wave and current action, secured from 12 to 15 ft. below the sand stratum. The shoulders of the embankment have been built to the height of the ties to shield the track from the direct wash of the incoming water and

the growth of sea marsh cane will be encouraged on the slopes as a further protection against wash.

In order to increase the weight of the track rails of 90 lb. section are now replacing the 70 and 80 lb. rails formerly used. The track is anchored to the roadbed by Crouse-Hinds Co. harpoon anchors, which are driven in pairs, one on each side of the track, these double anchors being placed at intervals of 66 ft. along the track for the entire distance between Lakeshore, Miss., and Micheaud, La. These anchors were driven down until the tops were 24 in. below the base of the rail and were then drawn up 20 in. by means of track jacks to open the flukes or barbs. Each anchor has a holding power of 9,000 lbs.

The track is attached to the anchors by rail clamps loosely connected to the ring at the head of the anchor shaft by wraps of galvanized wire to admit of the rail "running." This anchor connection may be readily detached to admit of track adjustment. In addition to this, the bridges have in some cases been raised to a greater elevation and the construction of the superstructure altered in some cases to diminish the water pressure.

At another point on the line between Pascagoula, Miss., and Gautier, where the road is exposed to the full force of the storms from the Gulf for a distance of about two miles, the work of raising the rails to a point above the highest recorded storm tide, or 11 ft. above mean tide, is in progress. This embankment is being protected by strong sheet piling wherever channels created by bayous in the sea marsh extend at right angles up to the embankment.

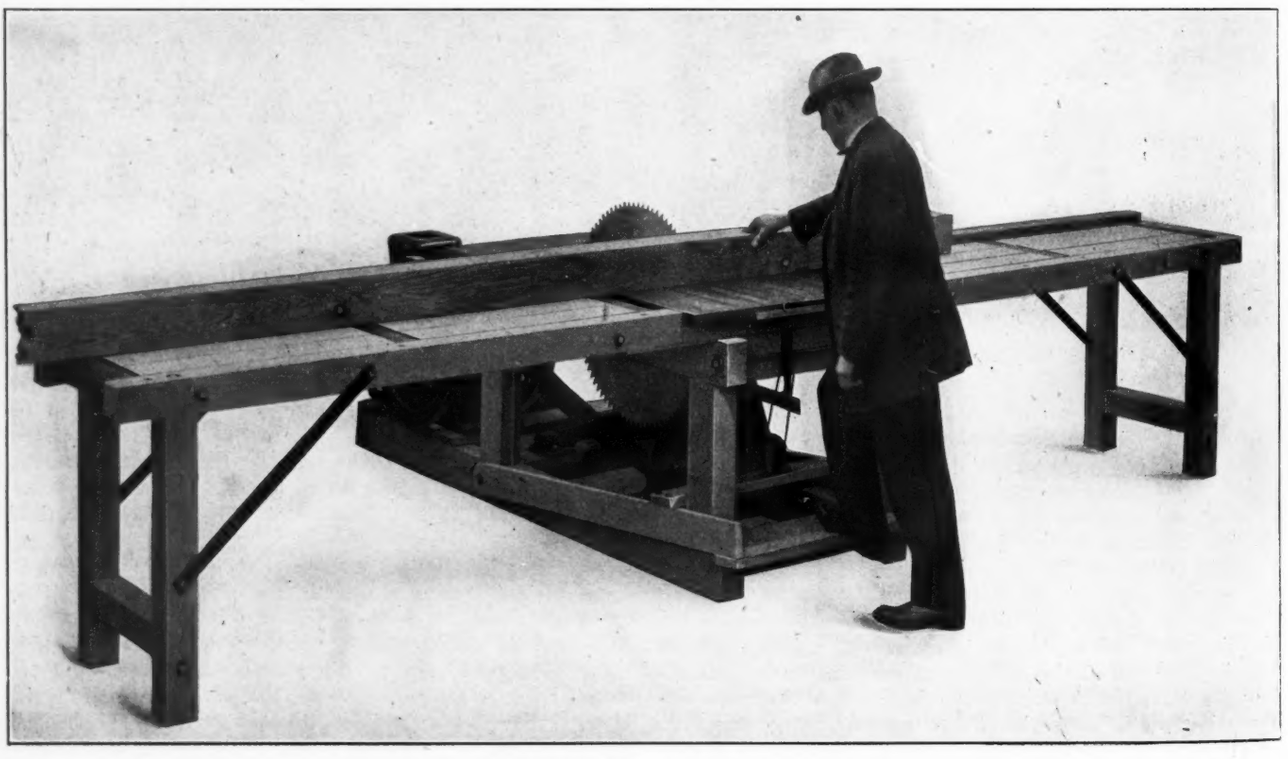
## A HEAVY COMBINED RIP AND CUT-OFF SAW.

A new machine for ripping and cutting up heavy timbers for bridge and dock work, heavy framing, concrete form construction and similar work, has recently been put upon the market by the American Saw Mill Machinery Co., of Hackettstown, N. J. This machine is driven either by a gasoline engine or by an electric motor mounted upon the frame immediately behind and belt connected directly to the saw, or it is built without power with a countershaft mounted on the frame to attach to other available power.

The frame is of selected timber, accurately framed and strongly bolted together. The central section, or main frame, which is used for ripping, is entirely self-contained and is constructed of 3½ in. x 5½ in. timber with a hardwood top 36 in. x 58 in., which is hinged at the top to permit its raising to allow free access to the mandrel and other working parts. A substantial steel ripping guide is provided, which is adjustable to any position on the table by a clamp screw. The extension tables at the sides are made of 3½ in. x 3½ in. timbers, 23 in. wide and 6 ft. long and are fitted with three 3½ in. steel rolls. These tables are secured to the center section by steel plates which rest on steel dowels, so arranged that when the table top is raised these extensions can be readily detached and the legs folded up for convenience in moving. The mandrel of 1 11/16 in. steel with a 4 in. x 6 in. pulley and is designed for saws with a 1¼ in. hole. It is carried in babbitted bearings on a substantial iron swinging frame which is drawn forward by means of a foot treadle. A device is provided for locking this swinging frame in any desired position when used as a rip saw. A belt tightener is also provided for maintaining a constant tension on the belt.

This machine is equipped with one 30 in. rip saw and one 30 in. cut-off saw with a maximum projection of 11 in. through the table top. The table stands 34 in. above the floor. The entire machine requires a floor space of 8 ft. x 15 ft., and weighs 1,100 lbs. without power.

RAILWAY IMPROVEMENTS IN THE NETHERLANDS.—A new railway line is soon to be constructed from Hoogeveen, in the province of Drenthe, to Ommen, in the province of Overysel. The distance is only 15 miles, but the new line will traverse a territory without railway facilities at present. This section is a great peat district. The railroad yards at Hoogeveen will be enlarged to meet the wants of the new line. Another important improvement in that region, soon to begin, is the double-tracking of the line between Hoogeveen and Groningen via Meppel, about 55 miles, coupled with enlargement of railway yards at several towns along the line.



New Rip and Cut-Off Saw.

# General News.

The Sonora Railway—the Southern Pacific's line in the western part of Mexico—is reported to be in the hands of the rebels for a distance of 246 miles.

The *Railway Record* has added up the amounts of fines which it has found reported as imposed on railroads during a single week, and finds the aggregate sum $739,275.

The Chesapeake & Ohio has made an increase of 10 per cent., dating from February 1, in the pay of all clerical employees whose salaries have been less than $150 a month.

The Central Safety Committee of the Chicago & North Western has awarded the company's "Safety" banner for the best record of safety for the year 1912 to the East Iowa division.

The Grand Rapids & Northwestern has placed an order with the Great Lakes Engineering Works for three steel car ferries to be operated from Ludington, Mich., to Milwaukee and Manitowoc, Wis.

The Atchison, Topeka & Santa Fe is planning to build a very complete reproduction of the Grand Canyon of Arizona to be exhibited at the Panama-Pacific Exposition in San Francisco. The reproduction of the canyon will occupy five acres.

An electric car propelled by the storage batteries of the Federal Storage Battery Car Company is now in service on the Newton Lower Falls branch of the Boston & Albany. This branch extends from Riverside, Mass., to Newton Lower Falls, one mile.

A grain elevator in the freight yards of the Michigan Central at East One Hundred and Twenty-first street and South Park avenue, Chicago, was destroyed by fire on March 9. The fire spread to a large number of freight cars loaded with grain, and caused a loss estimated at $125,000.

Charles A. Lutz, chief examiner of carriers' accounts for the Interstate Commerce Commission, has resigned that position to become controller of the United States Express Company. George G. Thompson, chief clerk in the post office department, who has had an important part in the establishment of the parcel post, is also to take a position with the United States Express Company, that of general purchasing agent.

A suit has been filed in the United States district court at Chicago against the Chicago & Eastern Illinois to recover $3,900 in penalties for failure to report instances where employees were worked more than 16 hours a day Fines aggregating $3,275 were imposed on the Chicago & Alton, the Chicago Junction, the Chicago, Milwaukee & St. Paul, the Grand Trunk, and the Wabash railways on March 4, in the United States court at Chicago for violations of the hours of service law, the safety appliance law, and the law regulating the shipment of cattle.

### The Grand Trunk in Southern New England.

As reported last week, page 446, the special committee of legislators and citizens, appointed by the governor of Rhode Island to consider the question of guaranteeing the bonds of the Southern New England, made an unfavorable report. It is now said that the governor will accept the opinion of the committee. At Montreal this week, Mr. Chamberlin, president of the Grand Trunk, said that work on the Southern New England from Palmer to Providence could be started immediately, provided the state of Rhode Island should guarantee the bonds; but he added that if the state refused to give the guarantee there would be no immediate prospects of a resumption of the work.

### Wireless Telegraph to Moving Trains.

The Delaware, Lackawanna & Western is to erect two wireless telegraph stations, one at Scranton, Pa., and one at Binghamton, N. Y., 65 miles north of Scranton, with a view to transmitting messages to passenger trains while they are moving on the road between the two places. Mr. Cullen, passenger traffic manager of the road says that if the experiments prove successful, receiving apparatus will be installed on all of the through passenger trains, and that he hopes to extend the wireless telegraph to Buffalo and to Hoboken—that is, throughout the length of the main line of the road, 410 miles.

### New Car Shops at Ashtabula.

The Lake Shore & Michigan Southern has bought land at Ashtabula, Ohio, in the western part of the city, on which to build a shop for the repair of its steel cars. On account of the large number of steel freight cars now in use, and as ore and coal moves chiefly through Ashtabula, for which traffic the steel cars are largely used, the shop is to be located at that point. The plant, including the cost of the land which has just been purchased, will cost in the neighborhood of $1,000,000.

### A Correction.

In the article on page 289 of the issue of February 14, entitled Superheater Switch Engines with Gaines Combustion Chamber, it was erroneously stated that a 7/8 in. bridge is used in the exhaust tip. This should be 3/8 in.

### New Trains to the Pacific Coast.

The new Overland Limited train on the Chicago & North Western and the Union Pacific, to be placed in service on April 1, on a 64-hour schedule from Chicago to San Francisco, will leave Chicago daily at 7 p. m., arriving at San Francisco at 9:30 the third morning. Eastbound the train will leave San Francisco at 2 p. m., arriving at Chicago at 9 a. m. the third day. An extra fare of $10 will be charged. On the same day the Chicago, Milwaukee & St. Paul and the Union Pacific will put into service a 72-hour train between Chicago and San Francisco and Los Angeles without extra fare, to be known as "The Pacific Limited." It will leave Chicago at 10:45 a. m., arriving at 9:40 a. m. on the third day at both Los Angeles and San Francisco, running via the San Pedro, Los Angeles & Salt Lake to Los Angeles, and via the Central Pacific to San Francisco.

### Unfilled Tonnage of the Steel Corporation.

The report of the United States Steel Corporation shows that on February 28, the unfilled tonnage was 7,656,714 tons, a decrease of 170,654 tons from the previous month. This decrease was about as expected, as the orders have been on the decline since October. In that month orders averaged about 80,000 tons a day; in November, 55,000 tons a day; in December, 46,000 tons a day; in January, 38,000 tons a day; and in February about 35,000 tons a day. The unfilled tonnage on January 31, 1913, was 7,827,368 tons; on December 31, 1912, 7,932,164 tons; on November 30, 1912, 7,852,883 tons; and on February 29, 1912, 5,454,200 tons. The present unfilled tonnage has been exceeded six times during the history of the corporation. The largest unfilled tonnage was on December 31, 1906, when it was 8,489,718 tons.

### The Very Latest Thing in Signs.

The Chicago & North Western has just installed a novel electric advertising sign over the river front in Chicago, facing the Rush street bridge. The sign measures 50 ft. square, and shows a large passenger locomotive and part of a train. In front of the locomotive is a semaphore signal which automatically changes from the stop position to the clear position. When the change has been made the driving wheels of the locomotive are seen to revolve and a small ribbon of smoke is emitted from the stack. When the signal goes back to the stop position the wheels slow down and stop. Surmounting the sign is a large trade mark of the company in colors, and underneath the train are a few lines of advertising of its service. The sign stands on the roof of one of the company's freight houses, and is so located that it is seen by thousands of people. The sign contains 3,800 tungsten lamps, 29,500 lbs. of steel and 30,000 ft. of wire. Its total weight is 18¾ tons.

### Railway Legislation.

An anti-pass bill has been defeated in the senate of the Utah legislature after it had been amended so as to allow most of the public officeholders of the state to ride free.

Both houses of the legislature of Connecticut have passed a bill amending the charters of common carriers so as to require

them to furnish free transportation to members of the legislature when that body is in session.

Both houses of the Texas legislature have passed a bill authorizing the St. Louis Southwestern of Texas to purchase and operate the Stephenville North & South Texas. An amendment to require the company to purchase the state railroad, running from Rusk to Palestine, was defeated.

A bill has been introduced in the Ohio legislature requiring all railways in the state to equip their trains entirely with steel passenger cars, and to install automatic block signals throughout their lines after January 1, 1914. Wooden passenger cars operated in the meantime are to be attached behind the steel cars if there are any in the train.

Both houses of the Oklahoma legislature have passed a bill to make 2¼ cents a mile the legal rate for passenger fares in the state until provided otherwise by the legislature or the corporation commission. The latter provision was inserted to enable the corporation commission to re-establish the 2-cent fare if the Supreme Court sustains the legality of that rate in cases now before it.

Both houses of the Indiana legislature have passed the bill drafted by Chairman Wood, of the railroad commission, providing for the elimination of grade crossings. The bill requires the newly established public service commission to keep on file a list of all highway crossings of railways, each to be designated by number, and provides for hearings before the commission, after which it may order a separation of the grades, at least three-fourths of the expense to be borne by the railway company, and not exceeding one-fourth by the county.

A Texas legislator thinks that some railway officers are not earning their salaries and has introduced a bill requiring the railroad commission to make such orders "as may be necessary to secure economy in the expense of operating the railways in Texas," and authorizing the commission to limit the salaries which railway corporations may pay, and such other orders "as may be necessary to prevent the dissipation of the earnings of railway corporations by unnecessary or extravagant expenditures to those performing no service, or unnecessary service."

### Proposed Improvements at Springfield, Mass.

The State Railroad Commissioners of Massachusetts, acting as a special commission, under a law passed in 1910, has made a report on proposed new railroad lines in and near Springfield, Mass., to meet the demands of the city for the abolition of grade crossings and the enlargement of passenger and freight facilities in the city. Changes, according to various plans, have been under consideration for several years, but there is much difference of opinion between the several railroad companies, and between the railroads and the city, and it does not appear when the present plan is to be carried out; but the commission makes its report in accordance with the mandate of the legislature. The plan has been filed with the Hampden county superior court, at Springfield. In its main features it is similar to one presented by William Barclay Parsons who was engaged to study the problem in 1911. The commissioners estimate that the cost of the plan will be $9,415,000, which does not include an extension into the state of Connecticut which would be a necessary part of the scheme.

The main feature of the plan is a new line for the New York, New Haven & Hartford from the south, on the west side of the Connecticut river, which line would join the Boston & Albany at the point where it crosses the river. The Union station would be remodeled so as to permit passengers to cross from one side to the other beneath the six main tracks. At present the station is on the track level. Other features of the plan are a new connection to the Central New England about 4 miles west of Springfield; a connection from the Boston & Albany east of the passenger station northward to the Boston & Maine at Chicopee; a connection between the main line and the Highland division of the New Haven road, and the elevation of the Boston & Albany tracks near the river to permit two streets to cross beneath the tracks.

### To Begin Work on Large Interchange Yards at Chicago.

The Belt Railway of Chicago has announced plans for beginning work at once on the improvements in the Clearing yards just outside of Chicago, including auxiliary yards and tracks, and several changes in the present alinement of the Belt, which will be necessary to put into effect the plan for using the Clearing yards for the interchange of through freight in the Chicago terminal district. The principal features of the plan by which thirteen of the principal railways entering Chicago become joint stockholders in the Belt, and have executed an operating agreement giving them equal rights to use the main tracks of the Belt for the movement of trains between their respective connections and yards and the clearing yards, were described in the *Railway Age Gazette* of March 22, 1912, page 693.

The Clearing property, including a hump classification yard with a capacity of 5,000 cars, has been acquired by the Chicago & Western Indiana, which owned the Belt, and leased to the Belt company, as reorganized, for a period of 50 years. The present yard, which has been lying practically idle for many years, is to be rebuilt and enlarged. The additions to it will include a group of receiving and departure yards located at the east and west ends of the present yard, which will be widened, additional ladder tracks in connection with the gravity mound, additional thoroughfare tracks connecting the west end of the yard with the main tracks of the Belt about one-half mile north of the present yard, new receiving and departure yards connecting the east end of the present yard and Hayford and a roundhouse, shops and office building to be located near the yard. Condemnation proceedings were started on March 8 to acquire about 150 acres of ground necessary for carrying out these plans, and it is expected that 3,000 men will be at work by April 1. When completed the work now planned will represent the first of a series of four parallel units planned to be built ultimately, and the first unit will have a capacity of about 10,000 cars. Later a large L. C. L. clearing house is to be built having a capacity sufficient for all of this class of traffic interchanged between the owners of the Belt and possibly for other roads in addition.

Transfers of through freight from east to west, west to east, and west to south, will be made in the yards at Clearing, thereby removing a large amount of interchange from the congested downtown terminals.

### Louisville & Nashville Passenger Bulletin.

This is the title of a monthly circular issued by the passenger department of the Louisville & Nashville, at New Orleans, for the information of the station agents of the company in the territory south of Birmingham. It is a four-page sheet 8½ in. x 11 in., and quite similar in style to the bulletin of the Canadian Pacific, which was noticed in the *Railway Age Gazette* of February 21, page 330. A prominent feature is the "blue ribbon roll," a list of 33 stations, giving the name of the agent at each, where there was a marked increase in the sales of tickets during the month of January, as compared with January of the preceding year. There is a special paragraph about E. W. Speed, agent at Marianna, Fla., who is such a good solicitor that he secured, by February 13, the promise of 42 persons to go over the Louisville & Nashville to the inauguration of the president at Washington. Marianna, according to the atlas, has less than 2,000 population; though it is a county seat. To go north over the Louisville & Nashville passengers from Marianna have first to travel 135 miles westward. The bulletin contains a short article by the division passenger agent on courtesy and one from an assistant superintendent of the same nature. Reprinting a circular which was issued by the general passenger agent two years ago, the bulletin gives the following hints for the guidance of—

*Experienced and Inexperienced Ticket Sellers.*

"Complaints reach us from time to time that passengers, who have made inquiries of agents or experienced ticket sellers, during the day hours, concerning tickets which they desire to purchase for night trains, are unable to obtain such tickets at night, various reasons for failing to provide them being assigned —such as inability of men on duty at night to find tickets or tariffs, unfamiliarity with tariffs, not being permitted to sell interline tickets, etc.

"It is the duty of agents to assist passengers in all legitimate ways to obtain the benefits of any fares or arrangements authorized by tariffs, and pains should be taken to provide the tickets desired or to enable night men to carry out representations made by employees on duty in the day time. When inexpedient for night men to sell any particular tickets for trains departing at late hours, they should be issued during the day, but,

even if night men are capable of issuing any tickets which may be called for, and passengers, especially when contemplating journeys of considerable length, prefer to complete their arrangements during the day, they should be accommodated. It is preferable, on the whole, that local tickets for comparatively short trips should not be issued, day or night, until the last train preceding that for which they are desired has departed, but such condition is not arbitrary, and should not be carried to the extent, reported in some cases, of agents positively refusing to sell tickets after departure of last preceding train, and compelling passengers to wait until half an hour or less before the time of departure of train on which tickets were to be used.

"It should be the rule for each and every employee who has given any passenger special information, based on painstaking examination of tariffs or schedules, and who may not be on duty when tickets to which such information relates are called for, to acquaint other employees with the particulars, so that no misunderstanding may exist. It often transpires that passengers receive certain information from one employee, and, supposing that other representatives of the company are in possession of like information, they apply for tickets without entering into details as completely as when making first inquiries, and discover later that they have not obtained tickets of the character or by the route selected when original inquiries were made."

### Boston Not the Whole of Massachusetts.

The universal electrification of railroads is an ideal beautiful to contemplate, but the proposal to have the Boston & Albany spend a great deal of money for the benefit of the metropolitan district of Boston does not inspire great enthusiasm among the rest of us along the line. Vice-President Hustis, in his statement before the legislative committee (*Railway Age Gazette*, February 28, page 400), shows how in 1912, for the first time since the lease, the deficit has been turned into a surplus. The length of the state the change has been appreciated. Nobody now complains of the Albany, and there is general confidence that Mr. Hustis is quite as much interested in serving the public as in making profits for the New York Central and the New Haven roads, who now share jointly the losses or profits of the Albany. Mr. Hustis said that the electrification for passenger service within the metropolitan district would cost over $6,400,000, and that there would be an added net loss in operation of nearly $550,000. This is a big burden for a small railroad to shoulder, particularly one just getting its feet on solid ground. The proposed electrification would again put the balance on the wrong side and would deprive all the rest of the road outside of Boston of improvements that it hopes for.—*Springfield Republican.*

### Commodities, Operating Steam Railroads.

The *Railway Age Gazette* has received the following letter under a Constantinople date line, but bearing an American postmark, which indicates that "Aziz Bey" is not the earnest and unsophisticated inquirer for information that he seems:

CONSTANTINOPLE, February 15, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

On examining the fifth annual report of the Public Service Commission of your state of New York, Second district, I find in Table 111-A, a list of "Commodities, operating steam railroad corporations."

We have in this country of ours quite a number of animals operating steam railroad corporations, including men, old women and asses, but so far as I am aware we do not term them "commodities."

I notice, however, that two of the commodities named in your list are "Live Stock" and "Poultry," which would seem to indicate that in your country, like ours, asses are so occupied, and possibly geese.

In another table of the same publication, 108-B, I notice that one of the railways has "Available for Service," two-thirds of one locomotive, and this appears to be a six-wheeled switcher. From another table I learn that this two-thirds of an engine was "in service" on June 30, 1911. It would be very interesting to learn the service of which an engine is capable, from which one-third has been removed. Possibly this arrangement was made by one of the commodities referred to above.

In the hope that you can give me full information on these interesting subjects, I remain,

Your most obedient servant,

AZIZ BEY.

### Drastic Grade Crossing Law in New Jersey.

Governor Fielder of New Jersey on Wednesday last signed the grade crossing abolition law. This was a bill which he introduced while serving as senator at the opening of the present session. The essential difference between the measure and that vetoed last year by Governor Wilson is that the present bill authorizes the public utility commission to determine what crossings shall be abolished, while the bill of last year made it compulsory upon railroads to do away with grade crossings at the rate of one for every mile of road each year.

President Rea, of the Pennsylvania Railroad had telegraphed to the governor, protesting against the approval of the bill, which provides for making the improvements at the sole expense of the railroads. Mr. Rea issued a statement showing the grave injustice done the railroads. He said:

"The Pennsylvania has long been committed to the policy of eliminating grade crossings as spedily as possible and is anxious that no laws be passed which will tend to deter, rather than encourage the rapid removal of all grade crossings.

"In the last 20 years the Pennsylvania has removed 110 crossings in the state of New Jersey, at an expense to the company of about $8,000,000, or $73,000 per crossing.

"There remain, however, some 1,200 grade crossings on the Pennsylvania system in New Jersey, the removal of which at $50,000 per crossing, would cost $60,000,000, an expenditure which would neither produce additional revenue, nor decrease expenses.

"It is to be hoped that the governor will appreciate the situation and veto the bill in the hope that one may be passed which will bring the state, the municipalities and the railroad together, insuring the apportionment of the cost in proportion to the equitable interests of all concerned."

## MEETINGS AND CONVENTIONS.

*The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.*

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 20, Chicago.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Annual meeting, June 17-20, Buffalo, N. Y.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, May 21, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-23, 1913, Montreal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Convention, June 11-13, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago. Next meeting, May, 1913, Baltimore, Md.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June, 1913, Atlantic City, N. J.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, June 18, Bluff Point, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual meeting, May 21-24, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 22-25, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Annual meeting, August 18, Richmond, Va.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Convention, June 16-18, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Annual meeting, September 9-12, Ottawa, Can.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meeting with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo. Next meeting, August 12-15, Nashville, Tenn.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City, Southern, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Meetings, March 17, Chicago; June 10-11, New York; convention, October 14, Nashville, Tenn.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Annual convention, May 19-21, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Convention, September 8-12, 1913, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Next meeting, April 17, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago. Annual meeting, June 17, Los Angeles, Cal.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, August, 1913, Chicago.

UTAH SOCIETY OF ENGINEERS.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock block, Chicago; 1st Monday in month, except July and August, Chicago.

# Traffic News.

The Intercolonial Railway is to establish a car ferry between Cape Tormentine, N. B., and Carleton Point, P. E. I.

The Mobile & Ohio announces a fast live stock train to be run twice a week from Meridian, Miss., to East St. Louis. The run of 520 miles from Meridian is to be made in about 24 hours.

The Great Northern, Northern Pacific, and Minneapolis, St. Paul & Sault Ste. Marie, have announced new rates on return shipments of threshing machines, engines or their parts, second-hand, which has been used or broken, worn or damaged, at 60 per cent. of the regular rates. The rates apply from stations in North and South Dakota to St. Paul, Duluth, Stillwater and other points.

The New York, New Haven & Hartford has opened a new freight station at Pier 70, East River, at the foot of East Twenty-second street, New York. This station will accommodate the wholesale silk and cotton goods merchants, who during the past few years have moved their stores from the old dry goods district to the neighborhood of Fourth avenue, between Union Square and Thirtieth street.

A committee of the Montana legislature has been holding an investigation of the freight rate situation in the state, and has reported its finding to the legislature with the recommendation that the legislature ask the railroad commission to reduce rates on carload shipments 25 per cent., or to 40 per cent. less than the rates for less than carload shipments. The railways have promised the committee to correct some instances of alleged discrimination found by the committee.

The next regular meeting of the Western Classification Committee is to be held in St. Louis, beginning April 1. The docket is unusually large and important, because this is the first meeting since that of July 7, 1911, at which classification No. 51, which was suspended by the commission for a year, until February 15, 1913, was adopted. The Southern Classification Committee will also hold a meeting on April 7, at Cincinnati, and a preliminary meeting of the Official Classification Committee will be held in Chicago on April 15.

### Liquors in Interstate Traffic.

The law passed by the last Congress, and re-passed by both houses after being vetoed by President Taft, regulating traffic in intoxicating liquors, is Public Statute No. 398. It is entitled "An act divesting intoxicating liquors of their interstate character in certain cases." It says, in substance, that the shipment or transportation in any manner or by any means of any spirituous, vinous, malted, fermented, or other intoxicating liquor, from one state to another, which said liquor is intended, by any person interested therein, to be received, possessed, sold, or used in violation of any law of the state into which it is destined, is prohibited.

### Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association in presenting statistical bulletin number 137-A, giving a summary of car surpluses and shortages by groups from November 22, 1911, to March 1, 1913, says: The total surplus on March 1, 1913, was 58,529 cars; on February 15, 1913, 52,700 cars; and on February 28, 1912, 44,984 cars.

The total shortage on March 1, 1913, was 27,148 cars; on February 15, 1913, 30,517 cars; and on February 28, 1912, 37,142 cars. Compared with the preceding period; there is an increase in the total surplus of 5,829 cars, of which 5,796 is in coal, 1,479 in miscellaneous, and a decrease of 842 box and 604 flat. The decrease in box car surplus is in groups 2 (New York, New Jersey, Delaware, Maryland and eastern Pennsylvania), 3 (Ohio, Indiana, Michigan and western Pennsylvania), 4 (the Virginias and Carolinas,), 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida), and 10 (Washington, Oregon, Idaho, California, Nevada and Arizona). The decrease in flat car surplus is in groups 1 (New England Lines), 5 (as above), 8 (Kansas, Colorado, Oklahoma, Missouri and Ar-

kansas), 9 (Texas, Louisiana and New Mexico), 10 (as above), and 11 (Canadian Lines). The increase in coal car surplus is in all groups, except 4 (as above), and 7 (Montana, Wyoming, Nebraska and the Dakotas). The increase in miscellaneous car surplus is general, except in groups 1, 4, 5 (as above), and 6 (Iowa, Illinois, Wisconsin and Minnesota).

Compared with the preceding period; there is a decrease in the total shortage of 3,369 cars, of which 1,539 is in box, 3,841 in coal, and an increase of 1,873 in flat and 138 in miscellaneous. The decrease in box car shortage is in groups 4, 5, 6, 7, 8 and 10 (as above). The decrease in coal car shortage is in all groups, except 7 and 10 (as above). The increase in flat car shortage is in all groups, except 5 and 7 (as above). The increase in miscellaneous car shortage is in groups 1, 2, 3, 6, 8, 9 and 11 (as above).

Compared with the same date of 1912; there is an increase in the total surplus of 13,545 cars, of which 6,943 is in box, 7,800 in coal, 1,368 in miscellaneous, and a decrease of 2,566 in flat car surplus. There is a decrease in the total shortage of 9,994 cars, of which 5,869 is in box, 4,798 in coal, 2,219 in miscellaneous, and an increase of 2,892 flat cars.

The accompanying table gives surplus and shortage figures by groups for the last period covered in the report and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1913.

### Car Balance and Performance.

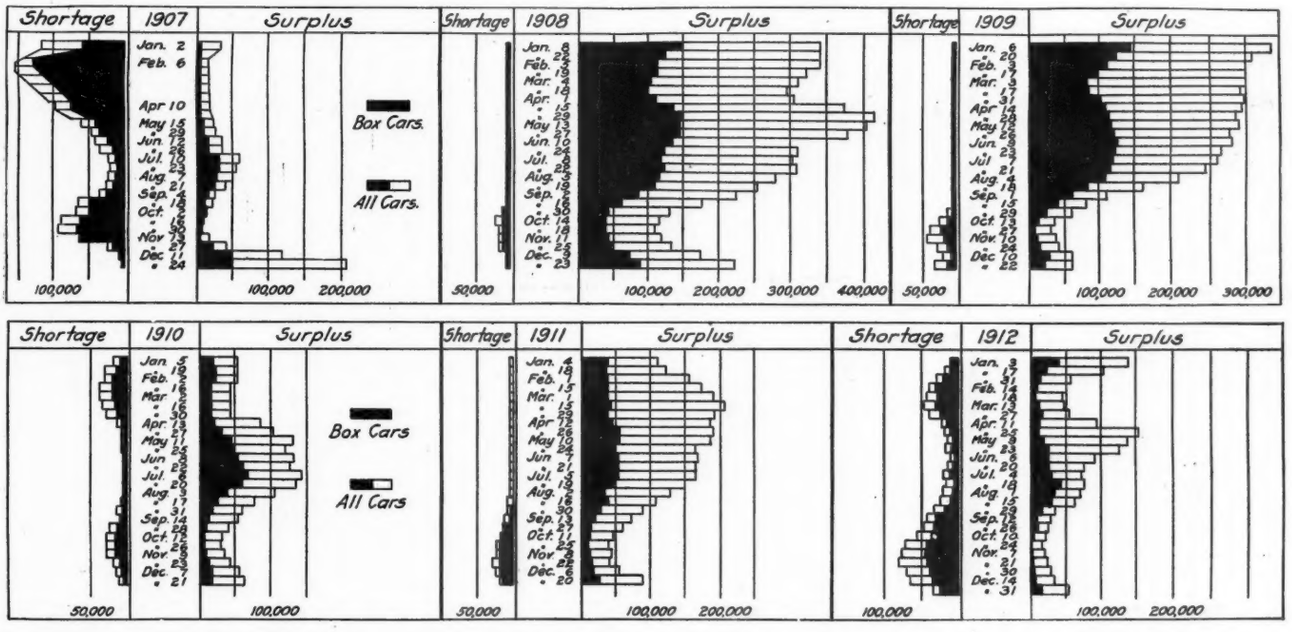
Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 140, covering car balances and performances for November, 1912, says:

The miles per car per day, for November was 26.0, maintaining the same figure as in October and the highest of which we have record. This figure for November, 1911, was 24.4.

CAR SURPLUSES AND SHORTAGES.

| Date. | No. of roads. | Surpluses: Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. | Shortages: Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Group *1.—March 1, 1913 | 7 | 0 | 74 | 33 | 3 | 110 | 871 | 108 | 22 | 726 | 1,727 |
| " 2.— " 1, 1913 | 34 | 468 | 59 | 1,196 | 252 | 1,975 | 438 | 1,186 | 1,939 | 14 | 3,577 |
| " 3.— " 1, 1913 | 32 | 79 | 641 | 4,240 | 1,798 | 6,758 | 4,248 | 71 | 134 | 837 | 5,290 |
| " 4.— " 1, 1913 | 12 | 5,475 | 127 | 952 | 947 | 7,501 | 844 | 674 | 560 | 0 | 2,078 |
| " 5.— " 1, 1913 | 26 | 21 | 0 | 1,561 | 639 | 2,221 | 2,943 | 502 | 382 | 69 | 3,896 |
| " 6.— " 1, 1913 | 33 | 1,929 | 1,061 | 3,163 | 2,727 | 8,880 | 4,404 | 684 | 193 | 351 | 5,632 |
| " 7.— " 1, 1913 | 5 | 243 | 240 | 623 | 631 | 1,737 | 130 | 0 | 82 | 0 | 212 |
| " 8.— " 1, 1913 | 18 | 1,158 | 360 | 2,645 | 2,374 | 6,537 | 437 | 39 | 13 | 83 | 572 |
| " 9.— " 1, 1913 | 15 | 1,927 | 268 | 477 | 1,066 | 3,738 | 50 | 12 | 0 | 9 | 71 |
| " 10.— " 1, 1913 | 26 | 4,133 | 1,583 | 3,149 | 8,786 | 17,651 | 649 | 26 | 30 | 167 | 872 |
| " 11.— " 1, 1913 | 7 | 534 | 237 | 0 | 650 | 1,421 | 2,631 | 321 | 0 | 269 | 3,221 |
| Total | 215 | 15,967 | 4,650 | 18,039 | 19,873 | 58,529 | 17,645 | 3,623 | 3,355 | 2,525 | 27,148 |

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.




Car Surpluses and Shortages, 1907 to 1913.

Ton miles per car per day was 424 in November, 1912, compared with 433 in October, 1912. This is an increase of 12.77 per cent. over the figure for November, 1911, which was 376.

The proportion of home cars on line was 48 per cent., compared with 50 per cent. in October. This figure for November, 1911, was 56 per cent.

There is an increase of 2.9 points to 75.9 per cent. in the percentage of loaded car mileage compared with October, 1912. The per cent. of loaded car mileage in November, 1911, was 70.8 per cent.

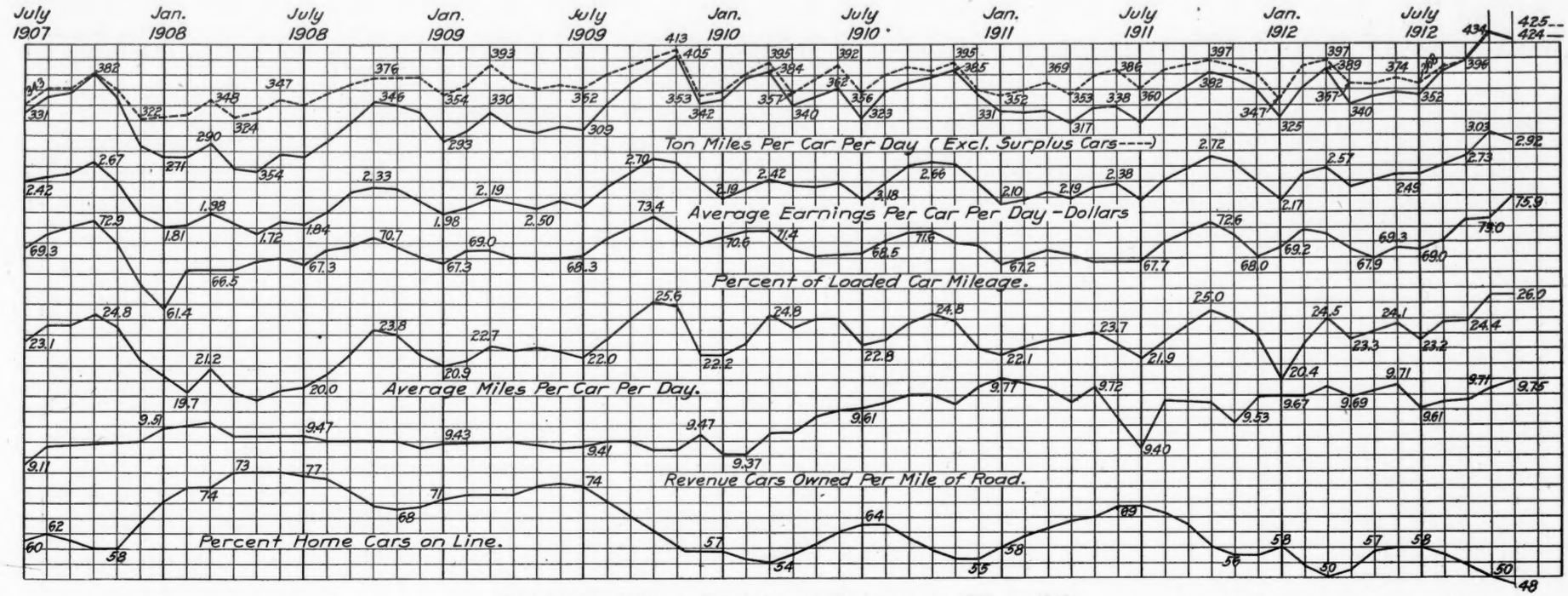
The average earnings per car per day of all cars on line were $2.92, compared with $3.03 in October. This is an increase of 10.61 per cent. over the earnings for November, 1911, which were $2.64.

The table on the next page gives car balance and performance

CAR BALANCE AND PERFORMANCE IN NOVEMBER, 1912.

| | New England. | N. Y., N. J., Del., Md., Eastern Pa. | Ohio, Ind., Mich., Western Pa. | Va., W. Va., No. and So. Carolina. | Ky., Tenn., Miss., Ala., Ga., Fla. | Iowa, Ill., Wis., Minn. | Mont., Wyo., Neb., Dakotas. | Kan., Colo., Okla., Mo., Ark. | Texas, La., New Mex. | Ore., Idaho, Nev., Cal., Ariz. | Canadian Lines. | Grand Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue freight cars owned | 83,928 | 685,245 | 221,094 | 189,845 | 170,206 | 413,617 | 17,206 | 140,777 | 29,537 | 141,683 | 126,425 | 2,219,563 |
| Average number of system cars on line | 38,484 | 314,817 | 101,259 | 84,135 | 65,723 | 247,866 | 4,421 | 54,811 | 16,307 | 60,571 | 85,865 | 1,074,259 |
| Railway-owned cars: Average foreign on line | 59,586 | 323,217 | 120,251 | 78,323 | 77,895 | 191,756 | 13,304 | 77,261 | 37,116 | 64,525 | 61,424 | 1,104,658 |
| Total Railway-owned cars on line | 106,875 | 638,034 | 221,510 | 162,458 | 143,618 | 439,622 | 17,725 | 132,072 | 53,423 | 125,096 | 147,289 | 2,187,722 |
| Excess | 14,142 | *47,211 | 416 | *27,387 | *26,588 | 26,005 | 519 | *8,705 | 23,886 | *16,587 | 20,864 | *40,646 |
| Per cent. of cars on line to total owned: | | | | | | | | | | | | |
| Home | 46 | 46 | 46 | 45 | 38 | 60 | 26 | 39 | 55 | 43 | 68 | 48 |
| Foreign | 71 | 47 | 54 | 41 | 46 | 46 | 77 | 50 | 126 | 45 | 49 | 50 |
| All railways | 117 | 93 | 100 | 86 | 84 | 106 | 103 | 89 | 181 | 88 | 117 | 98 |
| Private cars on line | 4,366 | 43,250 | 11,663 | 4,840 | 10,019 | 18,494 | 2,367 | 9,652 | 4,893 | 13,188 | 3,434 | 126,166 |
| Total, all cars on line | 111,241 | 681,284 | 233,173 | 167,298 | 153,637 | 458,116 | 20,092 | 141,724 | 58,316 | 138,284 | 150,723 | 2,313,888 |
| Per cent. of cars in shop | 6.66 | 5.33 | 8.04 | 6.71 | 7.29 | 6.93 | 6.37 | 6.78 | 4.88 | 4.43 | 4.08 | 6.22 |
| No. of freight engines owned | 1,419 | 10,459 | 3.173 | 3,456 | 2,830 | 6,623 | 539 | 2,785 | 872 | 3,007 | 2,139 | 37,302 |
| Average cars on line per freight engine owned | 78 | 65 | 73 | 48 | 54 | 69 | 37 | 51 | 67 | 46 | 70 | 62 |
| Total freight-car mileage | 58,653,660 | 534,611,178 | 160,279,050 | 134,905,524 | 126,556,800 | 354,474,967 | 32,138,532 | 102,194,510 | 43,132,159 | 139,835,529 | 121,291,072 | 1,808,072,981 |
| Average miles per car per day | 17.6 | 26.2 | 22.7 | 26.9 | 27.5 | 24.7 | 54.9 | 25.4 | 24.7 | 33.8 | 26.8 | 26.0 |
| Per cent. loaded mileage | 74.6 | 68.8 | 72.9 | 70.3 | 74.1 | 72.1 | 74.6 | 73.2 | 70.8 | 74.7 | 75.3 | 75.9 |
| Ton-miles of freight, including company freight | 704,972,821 | 9,182,186,012 | 3,004,486,228 | 2,241,163,888 | 1,914,270,106 | 4,192,994,423 | 525,436,346 | 1,588,946,662 | 561,598,645 | 2,127,077,365 | 1,749,348,527 | 27,792,481,023 |
| Average ton-miles, including company freight: | | | | | | | | | | | | |
| Per car-mile | 12.0 | 17.3 | 19.6 | 16.6 | 15.2 | 15.7 | 16.7 | 15.5 | 13.0 | 15.5 | 14.4 | 16.3 |
| Per loaded car-mile | 16.1 | 25.2 | 26.9 | 23.6 | 20.6 | 21.9 | 22.4 | 21.3 | 18.4 | 20.8 | 19.2 | 22.8 |
| Per car per day | 211 | 455 | 444 | 447 | 420 | 388 | 917 | 395 | 321 | 524 | 387 | 424 |
| Gross freight earnings | $7,610,574 | $53,749,486 | $16,367,713 | $13,881,466 | $13,683,915 | $39,536,914 | $3,774,897 | $14,126.105 | $5,490,352 | $21,753,309 | $12,527,151 | $202,501,882 |
| Average daily earnings: Per car owned | $2.71 | $2.61 | $2.47 | $2.44 | $2.68 | $3.19 | $7.31 | $3.25 | $6.20 | $5.14 | $3.30 | $3.04 |
| Per railroad car on line | 2.32 | 2.81 | 2.46 | 2.85 | 3.18 | 3.00 | 7.10 | 3.57 | 3.43 | 5.82 | 2.84 | 3.09 |
| All cars on line | 2.24 | 2.63 | 2.34 | 2.77 | 2.97 | 2.88 | 6.26 | 3.32 | 3.14 | 5.27 | 2.77 | 2.92 |

*Denotes deficiency.




Freight Car Mileage, Earnings and Performance, 1907 to 1912.

in the month covered by the report, and the diagram shows car earnings and car mileage and different car performance figures monthly from July, 1907.

### Car Location.

The accompanying table, which is taken from the car location bulletin No. 3-A of the American Railway Association, gives a summary of freight car location by groups on February 15, together with surpluses and shortages on the same date.

CAR LOCATION ON FEBRUARY 15, 1913.

| | New England. | N.Y., N.J., Del., Md., Eastern Pa. | Ohio, Ind., Mich., Western Pa. | Va., W. Va., No. & So. Carolina. | Ky., Tenn., Miss., Ala., Ga., Fla. | Iowa, Ill., Wis., Minn. | Mont., Wyo., Neb., Dakotas. | Kans., Colo., Okla., Mo., Ark. | Texas, La., New Mexico. | Oregon, Idaho, Nev., Cal., Ariz. | Canadian Lines. | Grand Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Cars Owned | 87,704 | 675,917 | 290,171 | 200,042 | 173,575 | 464,595 | 16,416 | 149,955 | 32,179 | 129,819 | 129,555 | 2,349,928 |
| Home Cars on Home Roads | 42,841 | 345,775 | 97,298 | 102,454 | 72,207 | 278,014 | 3,072 | 66,351 | 13,556 | 65,652 | 82,270 | 1,169,490 |
| Home Cars on Foreign Roads | 44,863 | 330,142 | 192,873 | 97,588 | 101,368 | 186,581 | 13,344 | 83,604 | 18,623 | 64,167 | 47,285 | 1,180,438 |
| Foreign Cars on Home Roads | 57,165 | 309,636 | 204,024 | 94,777 | 89.434 | 202,961 | 11,559 | 80,895 | 30,475 | 64,517 | 57,860 | 1,203,303 |
| Total Cars on Line | 100,006 | 655,411 | 301,322 | 197,231 | 161,641 | 480,975 | 14,631 | 147,246 | 44,031 | 130,169 | 140,130 | 2,372,793 |
| Excess or Deficiency | 12,302 | *20,506 | 11,151 | *2,811 | *11,934 | 16,380 | *1,785 | *2,709 | 11,852 | 350 | 10,575 | 22,865 |
| Surplus | 559 | 3,273 | 3,573 | 9,014 | 1,278 | 6,163 | 2,017 | 5,309 | 3,462 | 16,828 | 1,223 | 52,699 |
| Shortage | 1,373 | 5,463 | 4,071 | 3,693 | 4,795 | 7,424 | 464 | 587 | 71 | 1,191 | 2,189 | 31,321 |
| Shop Cars— | | | | | | | | | | | | |
| Home Cars in Home Shops | 5,195 | 26,831 | 15,377 | 8,316 | 9,906 | 20,187 | 416 | 7,750 | 1,595 | 4,000 | 3,604 | 103,177 |
| Foreign Cars in Home Shops | 1,554 | 8,269 | 6,250 | 2,181 | 2,676 | 5,520 | 469 | 2,356 | 1,129 | 2,466 | 748 | 33,618 |
| Total Cars in Shop | 6,749 | 35,100 | 21,627 | 10,497 | 12,582 | 25,707 | 885 | 10,106 | 2,724 | 6,466 | 4,352 | 136,795 |
| Per Cent. to Total Cars Owned— | | | | | | | | | | | | |
| Home Cars on Home Roads | 48.85 | 51.16 | 33.53 | 51.22 | 41.60 | 59.84 | 18.71 | 44.25 | 42.13 | 50.57 | 63.50 | 49.77 |
| Total Cars on Line | 111.84 | 96.97 | 103.74 | 98.59 | 93.12 | 103.53 | 89.13 | 96.07 | 136.83 | 100.27 | 108.16 | 100.97 |
| Home Cars in Home Shops | 5.93 | 3.97 | 5.30 | 4.16 | 5.71 | 4.63 | 2.53 | 5.23 | 4.96 | 3.08 | 2.78 | 4.45 |
| Foreign Cars in Home Shops | 1.22 | 1.22 | 2.15 | 1.09 | 1.54 | 1.27 | 2.86 | 1.46 | 3.51 | 1.90 | .58 | 1.45 |
| Total Cars in Shops | 7.15 | 5.19 | 7.45 | 5.25 | 7.25 | 5.90 | 5.39 | 6.69 | 8.47 | 4.98 | 3.36 | 5.90 |

*Denotes deficiency.

## INTERSTATE COMMERCE COMMISSION.

The commission has suspended until June 28, certain items providing for the withdrawal of store-door and pick-up service at Washington, D. C., contained in certain tariffs.

The commission has suspended until June 14, certain items in the tariff of the Chicago, Milwaukee & St. Paul, which contain advances in rates for the transportation of grain from South Dakota points to Chicago and Milwaukee.

The commission has further suspended from February 25, until August 25, the schedules in certain tariffs, which publish new rules affecting the transportation of baggage exceeding certain dimensions both east and west of the Mississippi river.

The commission has suspended from March 12 until September 12, the operation of certain tariff schedules which contain proposed advances in rates for the transportation of lumber between points in Louisiana and Mississippi and Memphis, Tenn.

The commission has further suspended from February 26, until August 26, the schedules in certain tariffs, which advance rates for the transportation of linseed oil from St. Paul, Minn., and other points to Chicago, Kansas City, Mo., and other points.

The commission has suspended from March 1 until September 1, an item in a supplement to W. H. Hosmer's tariff, which contains proposed advances in rates for the transportation of asphalt and asphaltum from points in Kansas to St. Louis, Mo., and other points.

The commission has further suspended from February 26 until August 26, certain schedules in W. H. Hosmer's tariff, which advance rates for the transportation of pig iron in carloads, from points in upper Michigan and Minnesota to Kansas City, Mo., and other points.

The New Orleans Lumber Men's Association has filed a complaint with the Interstate Commerce Commission attacking the agreement recently made by the railways and steamship lines regarding demurrage and free time on through export bill of lading shipments of cotton, lumber and other forest products.

Illinois grain dealers have filed a petition with the Interstate Commerce Commission against a proposed readjustment of joint through rates on grain and grain products from Illinois, Iowa, and Indiana specific group points to points in eastern trunk line territory, which the shippers claim will bring about general advances ranging from one-half cent to one cent per 100 lbs.

The commission has suspended until July 8, the operation of certain tariffs, which advance rates for the transportation of grain and grain products, in carloads, from Chicago and South Chicago, Ill., and Whiting and Indiana Harbor, Ind., to points in Indiana, Ohio, Michigan, Pennsylvania and Kentucky. The advances range from ½ cent to 1 cent per 100 lbs., and affect a large number of points.

The commission has suspended from March 10 until July 8, the operation of supplements to certain tariffs which contain advances in rates for the transportation of lumber, piling and other forest products, in carloads, from Bena, Schley, Cass Lake and other points in Minnesota to Superior, Wis., and Duluth, Minn. The present rate between these points is 7 cents per 100 lbs., and the proposed rate 8 cents.

The commission has suspended until April 30, the operation of the schedules in certain tariffs which attempted to cancel the through rates now in effect for the transportation of lumber and other articles from north Pacific coast points destined to Missouri, Iowa, Illinois and points in other states east and west of the Mississippi river when moving via the Northern Pacific, Silver Bow, Mont., and the Oregon Short Line.

The commission has suspended from March 10 until July 8, the operation of a supplement to the tariff of the St. Louis & San Francisco which canceled through rates applicable to the transportation of lumber and certain articles manufactured therefrom, originating at points in Alabama, Miss., and other states, and destined to points north of the Ohio river, also providing that combination rates apply. The present through rate from Brownfield, Miss., to New York is 36½ cents per 100 lbs., and the proposed combination rate is 44½ cents. Similar increases were contemplated between other points.

### Investigation of Water Connections.

In a general order to all railroads, the commission calls for a report, under oath, before April 15, showing what connections each may have in the transportation of freight or passengers by water. The information is to be used by the commission in the administration of the provision of the Panama Canal law, under which it will be unlawful, after July 1, 1914, for any railroad company to own, control, or have any interest in any common carrier by water operated through the Panama Canal *or elsewhere*, with which the railroad may be a competitor.

### Investigation of Private Cars.

The Interstate Commerce Commission has begun an extensive investigation of private freight car lines, and of the business of all owners of cars other than railroad companies. The investigation will be in charge of Commissioner McChord, and the examination of carriers' and car owners' accounts will be made under the direction of George P. Boyle. Circulars containing requests for information have been sent to railroad companies, to car owners and also to users of private freight cars. All shippers or associations interested in the subject are requested

to send in any information in their possession, and the replies are wanted in Washington by March 31.

No complete record of the freight cars in the United States has ever been made. All statistics hitherto gathered by the government, or by the American Railway Association have given either estimates or else no information at all, insofar as they deal with cars owned by other than railroad companies.

### Reparation Awarded.

*Henry H. Sheip Manufacturing Company v. Atlantic Coast Line et al. Opinion by the commission:*

The rate of 63 cents per 100 lbs. for the transportation of a carload of cigar-box lumber from Tampa, Fla., to Philadelphia, Pa., was found to have been unreasonable to the extent that it exceeded 32.5 cents. (26 I. C. C., 178.)

*Joe C. Sims v. Montpelier & Wells River et al. Opinion by the commission:*

The commission found that the rate of 8 cents per 100 lbs. charged for the transportation of granite and stone blocks or slabs from Louisville, Ky., to Lebanon, Ky., as part of the through rate from Barre, Vt., and Bedford, Ind., was unreasonable to the extent that it exceeded 5½ cents per 100 lbs., and ordered that rate for the future. (26 I. C. C., 275.)

### Complaint Dismissed.

*Wharton Steel Company v. Central of New Jersey et al. Opinion by the commission:*

The commission found that the rate of $1.15 per gross ton for the transportation of pig iron in carloads from Wharton, N. J., to Harrisburg, Pa., was not shown to have been unreasonable. (26 I. C. C., 166.)

*Minneapolis Steel & Machinery Company v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:*

The complainant was not found to have been damaged by reason of charges assessed for the transportation of carload shipments of structural steel from Minneapolis, Minn., to Miami, Ariz. (26 I. C. C., 193.)

*Public Service Commission of Washington v. Northern Pacific et al. Opinion by Commissioner Harlan:*

This case was originally decided in 23 I. C. C., 256, mentioned in the *Railway Age Gazette* of May 3, 1912, p. 1021. Subsequently the Great Northern asked the commission for a rehearing. The commission again went over the record in the light of the petition for a rehearing and of the suggestions filed in support of it, but adhered to its original decision and denied the petition of the defendant. (26 I. C. C., 272.)

*Motorcycle Manufacturers' Association v. Baltimore & Ohio et al. Opinion by Commissioner Prouty:*

On July 1, 1910, by official classification motorcycles were given a rating one and a half times first class l. c. l. and first class c. l. For some years previous the carload rating had been second class and the complainant attacked this advance as unreasonable. The commission found that the rates in question are just and reasonable as compared with the rates on bicycles and automobiles, and with the rates on motorcycles in other parts of the country. (26 I. C. C., 127.)

*New Pittsburgh Coal Company v. Hocking Valley. Opinion by Commissioner Meyer:*

The commission found that the rate of 85 cents per net ton on "lake-cargo coal" from the Hocking district of Ohio to the docks at Toledo, when for transshipment to points beyond, was not unreasonable at the time the complainant's shipments were transported. The commission is without authority to award reparation in any case unless it can conclude that the rate assailed was in violation of the act to regulate commerce during the period the shipments in question moved. (26 I. C. C., 121.)

*Tone Brothers v. Illinois Central et al. Opinion by Commissioner Clements:*

Under Western classification pepper is rated second class, any quantity, and under Official classification this commodity is rated fourth class in carloads and second class in less than carload quantities. The complainants contend that the classification of pepper under Western classification is unreasonable, as no special provision is made for shipments in carloads. The commission decided that as the classification of pepper under Western classification was under consideration in other proceedings, and as the tonnage shipped by the complainant was extremely light, it would be inappropriate to deal with that question in this case. (26 I. C. C., 279.)

*Davis Sewing Machine Company v. Pittsburgh, Cincinnati, Chicago & St. Louis et al. Opinion by the commission:*

On July 1, 1910, the rating in official classification on bicycles in carloads was advanced from second class to first class. The complainant contends that the first class rating on bicycles from Dayton, Ohio, to Chicago is unreasonable. In 22 I. C. C., 291, this was heard and the commission held that the advance had not been justified. Subsequently the defendant filed a petition for rehearing which was granted by the commission. The testimony shows that rates on all vehicles were advanced at the same time that the advances in question were made; also that the prices on bicycles had advanced. The defendant maintained that if the rates from Dayton to Chicago were reduced it would necessitate numerous other reductions. The commission found that the carriers had shown the advanced rate to be reasonable. (26 I. C. C., 282.)

### Linseed Oil Rate Advanced.

*In re investigation and suspension of advances in rates by carriers for the transportation of linseed oil from St. Paul, Minn., and other points to Chicago, Kansas City and other points. Opinion by Commissioner McChord:*

The suspended tariffs propose to advance the rate on linseed oil from St. Paul, Minn., to Peoria, St. Louis and Missouri river cities and points beyond; from Milwaukee and Chicago to St. Louis and Springfield, Ill., and between other points. Minneapolis interests contend that the proposed rate is unreasonable and discriminatory in that they would be placed at a disadvantage as compared with other producing points. The advance is also opposed by interests at Des Moines, Ia., on the ground that that city would be placed at a disadvantage as compared with Minneapolis. As a general rule oils take fifth class rates which are materially higher than the rates proposed, notwithstanding the value of linseed oil is much greater than that of other oils. The commission found also that the conditions as regards competition had materially changed since the establishment of the present rates. The complainants place but little emphasis upon the claims that the proposed rates are unreasonable in themselves and apparently base their contention upon the fact that the present rates are of long standing. They contend that the advanced rates would result in a discrimination against Minneapolis in favor of Buffalo, because that city would have a lower per-ton-mile rate for short hauls. The commission found that though it was true, as a general rule, that the ton-mile revenue decreases with increased distance, that rule had application to hauls over the same line in the same direction, and therefore it did not follow that Buffalo and Minneapolis should take the same or relatively the same per-ton-mile rate to common territory. The commission found that the revenue from the transportation of linseed oil as compared to the revenue from similar products was not remunerative to the carriers. It was decided also that the fact that the rate on flaxseed from Minneapolis to Chicago was recently increased, was an argument for higher rates on linseed oil. The commission decided that with the exception of the rate from Des Moines the defendants had shown the proposed advances to be reasonable. The order of suspension was vacated.

With regard to the rate from Des Moines it was shown that at the time of preparation of the tariff in question the carriers did not know Des Moines was a producing point and that the rates had been decided upon without particular attention to that point. The defendants practically admitted that the existing adjustment between Des Moines and Minneapolis was not entirely fair to Des Moines. The commission found that the proposed advance in the rates from Des Moines would result in discrimination against that point in favor of Minneapolis and ordered the defendants to withdraw the advanced rate from that point. The commission found that some advance from Des Moines would probably be necessary and made it clear that nothing in this decision would prevent the carriers from adjusting the Des Moines rate with the rates found reasonable from Minneapolis. (26 I. C. C. 265.)

## REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1913.

| Name of road. | Average mileage operated during period. | Operating revenues: Freight. | Passenger. | Total, inc. misc. | Operating expenses: Maintenance: Way and structures. | Of equipment. | Traffic. | Transportation. | General. | Total. | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama & Vicksburg | 143 | $108,893 | $39,127 | $159,230 | $26,895 | $33,182 | $3,618 | $55,844 | $5,805 | $125,344 | $33,886 | —$270 | $5,225 | $28,391 | $4,228 |
| Alabama Great Southern | 309 | 295,653 | 113,324 | 447,761 | 47,355 | 109,382 | 14,865 | 143,905 | 10,577 | 326,084 | 121,677 | —667 | 14,477 | 106,533 | 21,610 |
| Ann Arbor | 292 | 108,560 | 39,755 | 161,273 | 23,741 | 23,904 | 4,534 | 64,682 | 6,447 | 123,308 | 37,965 | —1,369 | 13,930 | 22,666 | 6,556 |
| Arizona Eastern | 366 | 188,930 | 37,922 | 238,042 | 24,470 | 21,349 | 2,363 | 63,997 | 9,040 | 121,219 | 116,823 | 26 | 11,800 | 105,049 | 25,925 |
| Atchison, Topeka & Santa Fe | 8,205[1] | 5,279,808 | 2,271,744 | 8,156,403 | 1,524,292 | 1,400,145 | 189,062 | 2,528,107 | 163,938 | 5,805,544 | 2,350,859 | ..... | 340,579 | 2,010,280 | 401,875 |
| Atlanta & West Point | 93 | 55,335 | 40,831 | 107,590 | 13,548 | 21,543 | 6,794 | 35,777 | 4,948 | 82,610 | 24,980 | 397 | 6,344 | 19,033 | —962 |
| Atlanta, Birmingham & Atlantic | 645[2] | 194,455 | 50,505 | 262,234 | 51,115 | 44,749 | 14,537 | 109,740 | 10,960 | 23,101 | 31,133 | ..... | 13,375 | 17,758 | —3,489 |
| Atlantic & St. Lawrence | 167 | 130,500 | 18,730 | 162,310 | 17,832 | 25,660 | 6,193 | 96,614 | 4,504 | 150,803 | 11,507 | ..... | 11,152 | .—4,645 | —10,187 |
| Atlantic City | 167 | 53,849 | 45,816 | 105,986 | 28,934 | 15,177 | 1,602 | 79,947 | 1,581 | 127,241 | —21,255 | —3,591 | 9,000 | —33,846 | 977 |
| Atlantic Coast Line | 4,612[3] | 2,152,457 | 850,931 | 3,255,137 | 402,242 | 465,399 | 63,561 | 1,115,450 | 78,609 | 2,125,261 | 1,129,876 | ..... | 125,000 | 1,004,876 | 338,268 |
| Baltimore & Ohio Chicago Terminal | 77 | ..... | 1,775 | 131,409 | 12,076 | 26,448 | 638 | 69,239 | 4,622 | 113,023 | 18,386 | 837 | 19,115 | 108 | —1,074 |
| Baltimore & Ohio—System | 4,455*a* | 6,873,559 | 1,080,922 | 8,404,004 | 1,143,968 | 1,543,793 | 177,927 | 3,266,670 | 171,632 | 6,303,990 | 2,100,014 | —68,801 | 233,100 | 1,798,113 | 829,468 |
| Bangor & Aroostook | 631[4] | 168,966 | 31,708 | 213,647 | 39,377 | 33,296 | 2,933 | 96,857 | 12,598 | 185,061 | 28,586 | ..... | 10,500 | 18,086 | —65,491 |
| Belt. Ry. Co. of Chicago | 21 | ..... | ..... | 265,374 | 15,124 | 41,068 | 431 | 132,231 | 5,401 | 194,255 | 71,119 | ..... | 7,928 | 63,191 | 27,293 |
| Bessemer & Lake Erie | 204 | 430,878 | 23,023 | 464,316 | 65,703 | 140,410 | 8,775 | 150,885 | 9,217 | 374,990 | 89,326 | ..... | 12,000 | 77,326 | 118,086 |
| Boston & Maine | 2,244 | 2,400,875 | 1,062,864 | 3,775,127 | 362,879 | 684,090 | 31,130 | 2,114,520 | 103,371 | 3,295,990 | 479,137 | 10,380 | 184,721 | 304,796 | —132,195 |
| Buffalo & Susquehanna *R. R.* | 265 | 140,018 | 7,359 | 151,742 | 28,449 | 21,225 | 1,188 | 54,154 | 5,788 | 110,804 | 40,938 | ..... | 2,200 | 38,738 | 16,111 |
| Buffalo & Susquehanna *Ry.* | 91 | 39,284 | 7,852 | 49,535 | 12,159 | 28,865 | 439 | 23,396 | 2,587 | 67,386 | —17,911 | —5 | 1,700 | —19,616 | —4,671 |
| Buffalo, Rochester & Pittsburgh | 574[5] | 726,667 | 80,762 | 830,535 | 100,379 | 167,307 | 12,099 | 306,757 | 18,793 | 605,335 | 225,200 | —762 | 19,000 | 205,438 | —3,792 |
| Butte, Anaconda & Pacific | 46 | 89,217 | 7,233 | 108,988 | 13,253 | 24,012 | 877 | 63,865 | 2,463 | 104,470 | 4,518 | ..... | 2,000 | 2,518 | —19,495 |
| Canadian Pacific Lines in Maine | 233 | 132,641 | 27,208 | 169,553 | 24,376 | 26,432 | 6,223 | 75,278 | 5,994 | 138,303 | 31,250 | ..... | 10,000 | 21,250 | 8,091 |
| Carolina, Clinchfield & Ohio | 238 | 185,787 | 13,420 | 203,190 | 12,565 | 23,859 | 7,434 | 36,256 | 8,322 | 88,436 | 114,754 | ..... | 8,000 | 106,754 | 16,536 |
| Carolina, Clinch. & Ohio Ry. Co. of S. C. | 18 | 12,766 | 1,461 | 14,438 | 576 | 96 | 1,083 | 3,080 | 431 | 5,266 | 9,172 | ..... | 500 | 8,672 | 2,924 |
| Central New England | 277 | 261,188 | 27,512 | 305,531 | 32,547 | 35,440 | 1,069 | 133,625 | 4,820 | 207,501 | 98,030 | —291 | 10,000 | 87,739 | —25,804 |
| Central of Georgia | 1,915 | 732,339 | 306,195 | 1,147,210 | 186,002 | 240,030 | 35,148 | 421,198 | 37,848 | 920,226 | 226,984 | 6,394 | 52,446 | 180,932 | 31,413 |
| Central of New Jersey | 669*b* | 1,747,885 | 382,318 | 2,260,927 | 217,621 | 375,861 | 26,779 | 701,227 | 41,700 | 1,363,188 | 897,739 | —26,009 | 178,486 | 693,244 | 87,231 |
| Central Vermont | 411 | 218,747 | 71,876 | 315,383 | 33,539 | 81,438 | 6,939 | 178,522 | 13,640 | 314,078 | 1,305 | —217 | 15,345 | —14,257 | —3,202 |
| Charleston & Western Carolina | 341 | 116,903 | 29,049 | 153,819 | 28,862 | 30,739 | 3,471 | 60,780 | 4,127 | 127,979 | 25,840 | ..... | 5,000 | 20,840 | 14,725 |
| Chesapeake & Ohio Lines | 2,324*c* | 2,442,617 | 413,885 | 2,979,278 | 321,276 | 679,945 | 54,838 | 1,026,867 | 65,153 | 2,148,079 | 831,199 | —3,225 | 127,155 | 700,819 | 29,788 |
| Chicago & Alton | 1,026 | 832,816 | 310,342 | 1,238,970 | 217,680 | 369,384 | 40,787 | 518,979 | 32,972 | 1,179,802 | 59,168 | —2,471 | 39,000 | 17,697 | —68,319 |
| Chicago & Eastern Illinois | 1,275 | 1,004,971 | 251,243 | 1,364,202 | 142,731 | 281,995 | 26,963 | 557,892 | 40,898 | 1,050,479 | 313,723 | —5,327 | 45,045 | 263,351 | 75,609 |
| Chicago & Erie | 270 | 354,960 | 55,604 | 458,777 | 56,160 | 101,006 | 22,237 | 252,608 | 12,153 | 444,164 | 14,613 | —1,436 | 13,333 | —156 | 53,693 |
| Chicago & Northwestern | 7,976[6] | 4,250,412 | 1,553,957 | 6,417,949 | 674,268 | 999,315 | 117,025 | 2,827,470 | 138,792 | 4,756,870 | 1,661,079 | —5,791 | 303,000 | 1,352,288 | 1,252,578 |
| Chicago, Burlington & Quincy | 9,129[7] | 5,195,962 | 1,690,005 | 7,623,161 | 465,634 | 1,336,379 | 120,848 | 2,677,404 | 214,488 | 4,814,753 | 2,808,408 | —21,055 | 274,587 | 2,512,766 | 869,918 |
| Chicago Great Western | 1,496 | 781,462 | 238,534 | 1,104,048 | 92,917 | 175,568 | 49,399 | 497,589 | 33,829 | 849,302 | 254,746 | —524 | 35,090 | 219,132 | 259,390 |
| Chicago, Indiana & Southern | 359 | 359,536 | 22,337 | 397,109 | 43,804 | 107,707 | 8,806 | 144,116 | 11,591 | 316,024 | 81,085 | —1,244 | 15,283 | 64,558 | 56,107 |
| Chicago, Indianapolis & Louisville | 617 | 334,274 | 116,938 | 506,083 | 71,870 | 90,199 | 17,624 | 220,050 | 14,611 | 414,354 | 91,729 | ..... | 23,234 | 68,495 | 2,126 |
| Chicago Junction | 12 | ..... | ..... | 151,773 | 10,954 | 13,308 | 1,025 | 83,896 | 3,775 | 112,958 | 38,815 | ..... | 1,882 | 36,933 | 8,527 |
| Chicago, Milwaukee & Puget Sound† | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Chicago, Milwaukee & St. Paul | 9,592*d* | 5,346,555 | 1,278,314 | 7,283,152 | 614,778 | 1,307,171 | 125,245 | 3,055,940 | 107,824 | 5,230,958 | 2,052,194 | —6,689 | 310,564 | 1,734,941 | 1,497,896 |
| Chicago, Peoria & St. Louis‡ | 255 | 107,416 | 21,792 | 136,990 | 15,790 | 19,548 | 7,598 | 66,203 | 7,762 | 116,901 | 20,089 | ..... | 4,300 | 15,789 | ..... |
| Chicago, Rock Island & Gulf | 477 | 208,614 | 64,925 | 291,682 | 21,870 | 23,607 | 11,038 | 122,339 | 8,665 | 187,519 | 104,163 | —501 | 7,935 | 95,727 | 78,800 |
| Chicago, Rock Island & Pacific | 7,566[8] | 3,282,172 | 1,478,336 | 5,106,067 | 684,143 | 851,324 | 159,335 | 2,447,997 | 139,394 | 4,282,193 | 823,874 | —17,308 | 236,624 | 569,942 | 103,043 |
| Chicago, St. Paul, Minneapolis & Omaha | 1,744 | 853,405 | 377,832 | 1,328,498 | 103,285 | 190,537 | 25,267 | 612,966 | 33,142 | 965,197 | 363,301 | —2,036 | 69,828 | 291,437 | 136,667 |
| Chicago, Terre Haute & Southeastern | 351 | 145,550 | 16,440 | 166,119 | 19,985 | 33,892 | 3,373 | 57,843 | 8,017 | 123,110 | 43,009 | 64 | 10,000 | 33,073 | —12,007 |
| Cincinnati, Hamilton & Dayton | 1,015 | 554,702 | 125,174 | 759,883 | 102,062 | 160,864 | 19,313 | 394,189 | 21,588 | 698,016 | 61,867 | ..... | 34,723 | 27,144 | —72,313 |
| Cincinnati, New Orleans & Texas Pacific | 337 | 715,370 | 173,765 | 932,341 | 72,485 | 214,456 | 24,848 | 275,089 | 19,649 | 606,527 | 325,814 | —1,657 | 29,800 | 294,357 | 98,009 |
| Cincinnati Northern | 245 | 76,479 | 15,167 | 96,857 | 17,199 | 37,393 | 2,662 | 47,878 | 3,013 | 108,145 | —11,288 | ..... | 5,500 | —16,788 | 7,608 |
| Cleveland, Cincinnati, Chic. & St. Louis | 2,014*e* | 1,901,953 | 606,374 | 2,727,999 | 299,519 | 582,886 | 71,661 | 1,246,032 | 59,646 | 2,259,744 | 468,255 | —2,414 | 103,800 | 362,041 | 224,850 |
| Colorado & Southern | 1,069[9] | 596,606 | 93,560 | 743,060 | 73,030 | 169,217 | 10,517 | 238,909 | 22,773 | 514,446 | 228,614 | —743 | 30,333 | 197,538 | 33,081 |
| Colorado Midland | 338 | 104,171 | 14,443 | 137,142 | 15,239 | 35,110 | 6,830 | 67,598 | 5,946 | 130,723 | 6,419 | —628 | 8,000 | —2,209 | —9,077 |
| Cumberland Valley | 162 | 215,551 | 51,191 | 280,201 | 46,691 | 33,756 | 4,381 | 104,609 | 7,801 | 196,538 | 83,663 | —1,212 | 5,702 | 76,749 | 28,596 |
| Delaware & Hudson Co.—R. R. Dept. | 854*f* | 1,809,646 | 205,306 | 2,080,181 | 145,303 | 320,680 | 23,188 | 705,066 | 61,239 | 1,255,476 | 824,705 | —2,011 | 49,700 | 772,994 | 268,025 |
| Delaware, Lackawanna & Western | 958 | 2,486,454 | 619,626 | 3,342,867 | 259,241 | 551,412 | 65,616 | 1,078,156 | 71,950 | 2,026,375 | 1,316,492 | 34,392 | 165,000 | 1,185,884 | 376,933 |
| Denver & Rio Grande | 2,550*g* | 1,400,097 | 327,782 | 1,806,324 | 158,628 | 395,261 | 41,117 | 693,324 | 61,105 | 1,349,435 | 456,889 | —5,386 | 80,400 | 371,103 | 99,521 |
| Denver, Northwestern & Pacific | 215 | 58,885 | 13,535 | 75,933 | 13,619 | 16,659 | 1,842 | 35,084 | 6,533 | 73,737 | 2,196 | ..... | 3,500 | —1,304 | —15,300 |
| Detroit & Mackinac | 411*h* | 49,026 | 24,461 | 80,865 | 9,881 | 14,617 | 2,319 | 37,824 | 3,177 | 67,878 | 12,987 | —619 | 8,613 | 3,755 | 10,226 |
| Detroit & Toledo Shore Line | 79 | 125,730 | ..... | 126,314 | 8,379 | 7,353 | 1,391 | 35,880 | 2,532 | 55,535 | 70,779 | ..... | 4,895 | 65,884 | 21,723 |
| Detroit, Grand Haven & Milwaukee | 191 | 120,000 | 42,000 | 185,897 | 46,664 | 29,792 | 8,027 | 123,508 | 5,094 | 213,085 | —27,188 | —74 | 2,953 | —30,215 | —18,090 |
| Detroit River Tunnel | 2 | ..... | ..... | 116,953 | 2,431 | 2,584 | ..... | 9,323 | 33 | 14,371 | 102,582 | ..... | 6,000 | 96,582 | 22,429 |
| Detroit, Toledo & Ironton | 441 | 109,078 | 10,593 | 129,598 | 35,044 | 16,940 | 2,704 | 88,647 | 5,754 | 149,089 | —19,491 | ..... | 6,000 | —25,491 | —26,900 |
| Duluth & Iron Range | 272[10] | 78,326 | 21,805 | 110,221 | 46,056 | 52,120 | 609 | 67,957 | 10,125 | 176,867 | —66,646 | —2,347 | 5,623 | —74,616 | —7,401 |
| Duluth, Missabe & Northern | 356[11] | 68,917 | 26,742 | 101,378 | 49,776 | 67,788 | 2,228 | 66,029 | 11,744 | 197,565 | —96,187 | —2,805 | 5,384 | —104,376 | 43,161 |
| Duluth, South Shore & Atlantic | 627*i* | 179,443 | 63,184 | 256,244 | 40,239 | 30,760 | 7,613 | 121,263 | 8,233 | 208,108 | 48,136 | 707 | 18,000 | 30,843 | 43,132 |
| Elgin, Joliet & Eastern | 819*j* | 1,010,063 | 9 | 1,091,445 | 107,454 | 164,344 | 4,980 | 355,941 | 15,896 | 648,615 | 442,830 | ..... | 20,333 | 422,497 | 189,100 |
| El Paso & Southwestern Co | 968[12] | 625,673 | 108,072 | 767,082 | 122,360 | 109,210 | 16,409 | 240,313 | 28,849 | 517,141 | 249,941 | —1,399 | 28,346 | 220,196 | —39,977 |
| Erie | 1,988*k* | 3,225,623 | 663,271 | 4,266,130 | 361,104 | 837,731 | 94,345 | 1,557,790 | 87,067 | 2,938,037 | 1,328,093 | —92,085 | 152,835 | 1,083,173 | 420,219 |
| Florida East Coast | 642*l* | 228,887 | 220,798 | 520,148 | 70,527 | 63,832 | 13,805 | 186,307 | 17,445 | 351,916 | 168,232 | —1,941 | 15,500 | 150,791 | 79,196 |

† Merged with Chicago, Milwaukee & St. Paul Ry. Company, January 1, 1913. ‡This road taken out of the hands of the Receivers on January 1, 1913. No comparison shown.

Average mileage operated during previous period—[1] 7,731; [2] 662; [3] 4,526; [4] 628; [5] 572; [6] 7,918; [7] 9,074; [8] 7,551; [9] 1,053; [10] 274; [11] 342; [12] 902; *a* 4.434; *b* 672; *c* 2,281; *d* 9.570; *e* 2,012; *f* 852; *g* 2,545; *h* 358; *i* 624; *j* 841; *k* 1,995; *l* 614. — Indicates Deficits, Losses and Decreases.

## REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1913—CONTINUED.

| Name of road. | Average mileage operated during period. | Operating revenues | | | Operating expenses | | | | | | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance | | | | | | | | | | |
| | | Freight. | Passenger. | Total, inc. misc. | Way and structures. | Of equipment. | Traffic. | Transportation. | General. | Total. | | | | | |
| Fort Worth & Denver City | 454 | $298,107 | $119,478 | $441,733 | $62,053 | $91,543 | $5,141 | $169,881 | $16,988 | $345,606 | $96,127 | —$736 | $9,087 | $86,304 | $2,751 |
| Galveston, Harrisburg & San Antonio | 1,338 | 660,701 | 273,111 | 995,068 | 114,441 | 233,239 | 37,508 | 457,057 | 32,942 | 875,387 | 119,681 | —10,765 | 27,726 | 81,190 | 29,847 |
| Georgia | 307 | 180,911 | 72,769 | 274,315 | 28,751 | 71,288 | 12,140 | 139,870 | 8,183 | 260,232 | 14,083 | ..... | 3,336 | 10,747 | —42,229 |
| Grand Rapids & Indiana | 578[13] | 279,971 | 118,804 | 430,842 | 60,497 | 81,031 | 10,651 | 199,360 | 15,785 | 367,324 | 63,518 | 13 | 23,641 | 39,890 | 50,578 |
| Grand Trunk Western | 347 | 390,000 | 164,000 | 589,744 | 59,621 | 94,933 | 26,792 | 275,049 | 16,480 | 472,875 | 116,869 | —1,658 | 29,877 | 85,334 | 6,994 |
| Great Northern | 7,774*m* | 3,272,597 | 942,012 | 4,590,482 | 516,911 | 834,529 | 92,958 | 1,706,080 | 102,682 | 3,253,160 | 1,337,322 | —10,952 | 232,776 | 1,093,594 | 375,494 |
| Gulf & Ship Island | 308 | 154,866 | 31,956 | 197,524 | 23,004 | 33,667 | 2,947 | 46,665 | 8,159 | 114,442 | 83,082 | ..... | 8,907 | 74,175 | 15,526 |
| Gulf, Colorado & Santa Fe | 1,596*n* | 870,258 | 222,761 | 1,156,142 | 223,821 | 183,902 | 26,515 | 475,750 | 49,665 | 959,653 | 196,489 | ..... | 38,408 | 158,081 | 9,935 |
| Hocking Valley | 352*o* | 431,146 | 69,644 | 528,885 | 48,275 | 130,124 | 8,498 | 182,490 | 13,570 | 382,957 | 145,928 | ..... | 37,500 | 108,428 | —63,320 |
| Houston & Texas Central | 789 | 343,158 | 137,011 | 525,564 | 101,399 | 108,155 | 18,259 | 233,680 | 20,985 | 482,478 | 43,086 | —1,070 | 16,458 | 25,558 | 78,386 |
| Houston, East & West Texas | 191 | 75,482 | 26,861 | 107,698 | 35,545 | 24,782 | 2,381 | 38,874 | 4,413 | 105,995 | 1,703 | ..... | 2,122 | —419 | —12,625 |
| Illinois Central | 4,763 | 3,521,496 | 1,117,636 | 5,328,737 | 621,586 | 1,139,079 | 113,983 | 2,230,514 | 119,646 | 4,224,808 | 1,103,929 | —2,243 | 237,750 | 863,936 | 1,130,592 |
| Indiana Harbor Belt | 105 | ..... | ..... | 287,678 | 26,269 | 27,803 | 2,763 | 136,806 | 7,638 | 201,279 | 86,399 | 587 | 5,500 | 81,486 | 48,566 |
| Kanawha & Michigan | 177[14] | 234,215 | 26,436 | 266,161 | 32,294 | 45,752 | 2,379 | 80,872 | 6,515 | 167,812 | 98,349 | —10 | 8,836 | 89,503 | 22,077 |
| Kansas City Southern | 827 | 677,709 | 127,381 | 893,765 | 70,798 | 95,022 | 27,287 | 315,789 | 35,848 | 544,744 | 349,021 | ..... | 41,142 | 307,879 | 191,087 |
| Lake Erie & Western | 906[15] | 386,030 | 66,402 | 478,779 | 65,361 | 101,334 | 11,393 | 202,871 | 12,103 | 393,062 | 85,710 | ..... | 20,000 | 65,717 | 33,732 |
| Lake Shore & Michigan Southern | 1,872[16] | 3,403,396 | 979,205 | 4,879,092 | 506,112 | 885,314 | 80,462 | 1,723,723 | 89,711 | 3,285,322 | 1,593,770 | —4,310 | 150,000 | 1,439,460 | 541,727 |
| Lehigh & Hudson River | 97 | 144,417 | 3,658 | 156,697 | 12,371 | 24,965 | 1,357 | 59,273 | 4,747 | 102,712 | 53,985 | ..... | 4,000 | 49,985 | 15,819 |
| Lehigh Valley | 1,452[17] | 2,963,537 | 304,661 | 3,396,614 | 491,190 | 642,589 | 79,628 | 1,201,202 | 72,558 | 2,487,167 | 909,447 | —19,854 | 118,500 | 771,093 | 171,407 |
| Long Island | 399 | 237,932 | 449,936 | 727,523 | 123,052 | 115,230 | 10,020 | 406,073 | 26,539 | 680,914 | 46,609 | 10,179 | 63,126 | —6,338 | —5,696 |
| Louisiana & Arkansas | 255 | 126,286 | 18,113 | 149,550 | 20,813 | 21,315 | 2,331 | 41,034 | 5,078 | 90,571 | 58,979 | ..... | 4,500 | 54,479 | 16,574 |
| Louisiana Ry. & Navigation | 351 | 115,464 | 20,800 | 148,547 | 26,424 | 17,407 | 6,625 | 62,490 | 6,768 | 119,714 | 28,833 | ..... | 4,500 | 24,333 | 17,197 |
| Louisiana Western | 208 | 130,864 | 63,860 | 202,832 | 37,851 | 38,029 | 9,207 | 60.899 | 6,315 | 152,031 | 50,801 | —1,123 | 7,259 | 42,419 | 18,304 |
| Louisville & Nashville | 4,919[18] | 3,843,287 | 1,064,520 | 5,217,579 | 905,313 | 977,593 | 112,258 | 1,758,657 | 132,612 | 3,886,433 | 1,331,146 | —532 | 154,742 | 1,175,872 | 182,815 |
| Louisville, Henderson & St. Louis | 200 | 61,901 | 23,926 | 93,598 | 27,454 | 13,128 | 4,621 | 37,771 | 3,127 | 86,191 | 7,407 | 8 | 3,000 | 4,415 | —14,268 |
| Maine Central | 1,206*p* | 562,654 | 202,086 | 816,252 | 83,654 | 128,603 | 7,465 | 358,990 | 26,733 | 605,445 | 210,807 | —6,259 | 46,736 | 157,812 | 84,103 |
| Michigan Central | 1,817 | 1,986,714 | 648,878 | 2,901,385 | 341,876 | 468,920 | 71,954 | 1,284,287 | 51,711 | 2,218,748 | 682,637 | 2,767 | 116,000 | 569,404 | 99,800 |
| Midland Valley | 373 | 69,249 | 36,430 | 112,438 | 28,418 | 22,856 | 2,469 | 44,549 | 5,438 | 103,730 | 8,708 | 36 | 5,964 | 2,780 | —13,531 |
| Minneapolis, St. Paul & Sault Ste. Marie | 3,976*q* | 1,672,761 | 559,543 | 2,383,727 | 185,483 | 339,417 | 58,304 | 907,399 | 65,177 | 1,555,780 | 827,947 | 6,456 | 146,869 | 687,534 | 317,739 |
| Missouri, Kansas & Texas System | 3,817*r* | 1,728.646 | 755,496 | 2,657,549 | 340,634 | 280,022 | 65,104 | 1,188,503 | 88,370 | 1,962,633 | 694,916 | —5,490 | 102,808 | 586,618 | 179,389 |
| Missouri Pacific | 3,920*s* | 1,612,115 | 390,992 | 2,196,699 | 321,026 | 385,178 | 58,231 | 1,015,681 | 64,694 | 1,844,810 | 351,889 | —3,658 | 98,190 | 250,041 | 153,877 |
| Mobile & Ohio | 1,114 | 884,206 | 111,721 | 1,053,077 | 111,592 | 194,568 | 38,667 | 390,708 | 33,859 | 769,394 | 283,683 | —1,269 | 30,690 | 251,724 | 72,630 |
| Monongahela | 65 | 148,406 | 2,387 | 152,680 | 14,328 | 7,757 | 438 | 29,289 | 2,207 | 54,019 | 98,661 | ..... | 2,200 | 96,461 | 34,674 |
| Morgan's La. & Tex. R. R. & S. S. Co. | 404 | 239,206 | 99,635 | 360,542 | 77,104 | 70,910 | 16,058 | 172,730 | 12,394 | 349,196 | 11,346 | —1,892 | 18,500 | —9,046 | —129,733 |
| Nashville, Chattanooga & St. Louis | 1,231*t* | 790,864 | 258,277 | 1,139,167 | 189,958 | 207,109 | 39,026 | 443,086 | 28,006 | 907,185 | 231,982 | —1,235 | 25,416 | 205,331 | 23,472 |
| Nevada Northern | 165 | 116,888 | 14,636 | 134,898 | 13,423 | 19,072 | 417 | 34,834 | 3,605 | 71,351 | 63,547 | ..... | 6,300 | 57,247 | —92 |
| New Orleans & North Eastern | 196 | 246,985 | 54,094 | 325,431 | 32,673 | 57,445 | 9,912 | 122,402 | 13,178 | 235,610 | 89,821 | —574 | 11,350 | 77,897 | 18,021 |
| New Orleans Great Northern | 283 | 119,999 | 26,590 | 158,196 | 23,491 | 11,322 | 2,614 | 44,766 | 6,625 | 88,818 | 69,378 | —63 | 2,650 | 66,665 | 39,782 |
| New Orleans, Texas & Mexico | 276 | 116,778 | 17,561 | 143,210 | 23,749 | 8,225 | 3,764 | 65,094 | 7,233 | 108,065 | 35,145 | ..... | 4,726 | 30,419 | 14,073 |
| New York Central & Hudson River | 3,597 | 5,513,997 | 2,480,874 | 8,952,397 | 1,166,992 | 1,620,835 | 161,909 | 3,607.319 | 247.868 | 6.804,923 | 2,147,474 | 55,567 | 539,609 | 1,663,432 | 584,297 |
| New York, Chicago & St. Louis | 564[19] | 974,804 | 113,240 | 1,117,676 | 84,133 | 201,396 | 48,590 | 500,853 | 17,654 | 852,626 | 265,050 | —2,232 | 32,000 | 230,818 | 111,900 |
| New York, New Haven & Hartford | 2,091 | 2,830,466 | 2,051,095 | 5,443,498 | 644,977 | 915,785 | 32,145 | 2,519,180 | 197,317 | 4,309,404 | 1,134,094 | —20,056 | 314,000 | 800,038 | —370,597 |
| New York, Ontario & Western | 566 | 604,378 | 75,623 | 709,125 | 80,961 | 141,502 | 9,636 | 294,874 | 15,944 | 542,917 | 166,208 | 4,968 | 18,167 | 153,009 | 67,563 |
| New York, Philadelphia & Norfolk | 112 | 214,774 | 36,311 | 273,731 | 22,800 | 55,755 | 3,321 | 133,104 | 12,446 | 227,426 | 46,305 | ..... | 8,000 | 38,305 | 12,007 |
| New York, Susquehanna & Western | 154*u* | 170,517 | 42,634 | 245,044 | 16,343 | 29,907 | 1,627 | 109,799 | 5.289 | 162,965 | 82,079 | —7,550 | 14,673 | 59,856 | 2,908 |
| Norfolk & Western | 2,019*v* | 3,349,290 | 355,883 | 3,823,572 | 371,864 | 720,685 | 59,823 | 1,134,243 | 65,803 | 2,352,418 | 1,471,154 | —2,020 | 122,000 | 1,347,134 | 602,495 |
| Norfolk Southern | 562 | 203,193 | 62,081 | 289,410 | 45,022 | 40,594 | 5,091 | 92,401 | 17,413 | 200,521 | 88,889 | —402 | 7,510 | 80,977 | 19,752 |
| Northern Central | 472[20] | 790,399 | 178,360 | 1,048,457 | 153,784 | 245,188 | 14,790 | 557,814 | 26,683 | 998,259 | 50,198 | 249 | 42,230 | 8,217 | 73,457 |
| Northern Pacific | 6,240[21] | 3,850,396 | 1,053,369 | 5,234,317 | 599,416 | 679,167 | 101,962 | 2,003,681 | 113,216 | 3,497,442 | 1,736,875 | 10,134 | 321,837 | 1,425,172 | 737,438 |
| Northwestern Pacific | 401*w* | 79,951 | 112,821 | 216,329 | 41,639 | 40,862 | 3,282 | 107.612 | 13.557 | 206.952 | 9,377 | ..... | 12,579 | —3,202 | 1,405 |
| Oregon Short Line | 1,914*x* | 1,200,088 | 320,091 | 1,649,201 | 188,533 | 235,150 | 36,184 | 476,056 | 43.082 | 979.005 | 670,196 | —1,584 | 97,900 | 570,712 | 80,540 |
| Oregon-Washington R. R. & Nav. Co. | 1,919*y* | 823,415 | 324,370 | 1,248,901 | 175,164 | 184,244 | 49,859 | 577,197 | 54,199 | 1,040.663 | 208,238 | —6,480 | 96,674 | 105,084 | 75,936 |
| Pecos & Northern Texas | 479 | 143,029 | 37,316 | 190,449 | 25,160 | 40,577 | 3.868 | 70.906 | 6,558 | 147,069 | 43,380 | ..... | 6,325 | 37,055 | 24,715 |
| Pennsylvania Co. | 1,751*z* | 3,781,519 | 781,582 | 5,042,347 | 804,875 | 1,038,467 | 82,396 | 2,010,194 | 114,299 | 4,050,231 | 992,116 | —4,193 | 237,270 | 750,653 | 240,210 |
| Pennsylvania R. R. | 4,025[22] | 10,834,606 | 2,772,703 | 14,691,689 | 2,007,474 | 3,254,786 | 194,089 | 5,824,819 | 339,562 | 11,620,730 | 3,070,959 | —132,114 | 595,919 | 2,342,926 | 755,518 |
| Peoria & Eastern | 352 | 216,537 | 55,470 | 291,105 | 34,892 | 55,443 | 4,523 | 129,559 | 6,123 | 230,540 | 60,515 | ..... | 10,400 | 50,165 | 30,558 |
| Pere Marquette | 2,330[23] | 1,017,497 | 291,875 | 1,415,192 | 212,173 | 258,865 | 31,079 | 634,293 | 36,263 | 1.172,673 | 242,519 | —7,427 | 49,791 | 185,301 | 270.506 |
| Philadelphia & Reading | 1,015 | 3,617,532 | 535,261 | 4,371,722 | 376,885 | 729,518 | 37,786 | 1,417.163 | 62,473 | 2,623.825 | 1,747,897 | 39,146 | 85,722 | 1,701,321 | 511,885 |
| Philadelphia, Baltimore & Washington | 713 | 757,319 | 671,599 | 1,635,441 | 295,670 | 319,485 | 30,889 | 731,675 | 39,976 | 1,417,695 | 217,746 | ..... | 51,101 | 166,645 | 53,412 |
| Pittsburgh & Lake Erie | 223*aa* | 1,413,301 | 131,966 | 1,602,254 | 144,563 | 258,835 | 13,301 | 391,004 | 26.598 | 834,301 | 767,953 | —62 | 36,200 | 731,691 | 264,437 |
| Pittsburgh, Cincinnati, Chic. & St. Louis | 1,472*bb* | 2,712,049 | 682,547 | 3,834,372 | 529,169 | 834,878 | 74,457 | 1,496,317 | 74,751 | 3,009,572 | 824,800 | —238 | 136,563 | 687,999 | 79,776 |
| Pittsburgh, Shawmut & Northern | 279[24] | 69,589 | 8,390 | 30,143 | 35,328 | 38,716 | 1,313 | 59,873 | 4,215 | 39.445 | 40,698 | ..... | 1,587 | 39,111 | —7,302 |
| Port Reading | 21 | 139,992 | ..... | 142,720 | 7,058 | 29 | 30 | 37.859 | 98 | 45.074 | 97,646 | 8,480 | 8,000 | 98,126 | 30,967 |
| Richmond, Fredericksburg & Potomac | 88*cc* | 131,637 | 91,604 | 258,465 | 19,284 | 30,822 | 3,174 | 95,255 | 6,901 | 155,436 | 103,029 | —355 | 722 | 101,952 | 39,189 |
| Rutland | 468 | 151,980 | 78,208 | 269,259 | 35,359 | 63,984 | 7,265 | 126,455 | 5,325 | 238,388 | 30,871 | ..... | 14,895 | 15,976 | —680 |
| St. Joseph & Grand Island | 319 | 77,543 | 28,439 | 117,180 | 29,276 | 19,499 | 5,355 | 57,433 | 5,844 | 117,407 | —227 | —38 | 6,244 | —6,509 | —6,778 |
| St. Louis & San Francisco | 4,742*dd* | 2,450,428 | 883,878 | 3,571,866 | 369,111 | 447,951 | 79.334 | 1,363,026 | 99.449 | 2,358.871 | 1,212,995 | ..... | 163,200 | 1,049.795 | 289,477 |
| St. Louis, Brownsville & Mexico | 518*ee* | 136,193 | 79,743 | 231,734 | 34,660 | 26,696 | 4,089 | 124,155 | 8,623 | 198,223 | 33,511 | ..... | 5,500 | 28,011 | —16,251 |

Average mileage operated during previous period—[13] 586; [14] 176; [15] 886; [16] 1,775; [17] 1,450; [18] 4,705; [19] 562; [20] 473; [21] 6,034; [22] 4,018; [23] 2,333; [24] 278; *m* 7,274; *n* 1,597; *o* 353; *p* 1,204; *q* 3,770; *r* 3,399; *s* 3,915; *t* 1,230; *u* 152; *v* 2,014; *w* 404; *x* 1,762; *y* 1,920; *z* 1,760; *aa* 215; *bb* 1,467; *cc* 83; *dd* 4,732; *ee* 510. — Indicates Deficits, Losses and Decreases.

## STATE COMMISSIONS.

The Illinois railroad commission has suspended until May 1 a proposed advance of one cent per 100 lbs. in rates on grain from points in Illinois to Chicago, pending an investigation of the reasonableness of the advance.

The State Railroad Commission of Pennsylvania has notified the Pennsylvania Railroad and the Philadelphia & Reading that it is going to send accountants to make a thorough examination of their books with a view to determining the cost of carrying anthracite coal to Philadelphia.

The Texas railroad commission has issued an order directing all railways in the state to file a detailed statement showing expenditures for additions and betterments for each fiscal year since the commission's original valuation of their property. The statements are to be filed within 30 days.

The California railroad commission has announced that it has decided to assist the fruit growers of the state in presenting to the Interstate Commerce Commission their application for a reduction in the minimum carload weight for deciduous fruit moving from California in interstate commerce.

## COURT NEWS.

After both houses of the Texas legislature had re-passed over the governor's veto, the bill to permit the Missouri, Kansas & Texas of Texas to absorb several subsidiary lines in Texas, a temporary restraining order to prevent the consolidation was issued by Judge Calhoun of the Texas district court, at Austin, Tex., at the instance of the state authorities. The petition for an injunction asserted that the proposed consolidation would be contrary to the state constitution.

Judge McCall in the United States Court for the western district of Tennessee, in a suit against the Yazoo & Mississippi Valley, sustains that clause of the hours-of-service law which authorizes the imposition of a penalty of $100 a day for each day that any railroad shall continue in default of the requirement that reports must be made every month, showing all cases of employees having been on duty for a longer period than 16 hours. The penalty in the hours-of-service law is enforced in accordance with the procedure set forth in the twentieth section of the interstate commerce law. The railroad company sought to show that the penalty in the case of the hours-of-service law should not be so rigidly imposed as in the case of failure to make an annual report; but the court says that when the language of a statute is plain and unambiguous its harshness should not be ameliorated by instructions of the court.

### Decision on Hours of Service Act.

In two cases against the Minneapolis, St. Paul & Sault Ste. Marie and two against the Northern Pacific, Judge Amidon, in the United States District Court, for North Dakota, Southwestern Division, holds as follows:

1. Hot boxes, loosened drawbars, etc., are matters which constantly arise and cannot be accepted as excuses for the violation of the federal hours of service law.
2. All substantial violations of the statute limiting the period of continuous employment of men engaged in railroad service must be regarded as serious—much more serious than violations of the safety appliance and the 28-hour live-stock statutes.
3. Courts must look at the subject matter of laws to ascertain whether the public welfare is seriously or only slightly involved in their violation.
4. Fatigue is as truly a physical cause of accident as are open switches and broken rails.
5. A substantial violation of the statute here involved can never justify a merely nominal fine.

PROPOSED RUSSIAN RAILROAD.—The Russian Ministry of Ways of Communication has decided to make an investigation in regard to the projected line from Saratov to Novotcherkask. This line would be 400 miles long, would traverse the grain territories of the Don Cossacks territory, and would be of great importance in connection with the future South Siberian Railway, as it would create a direct transit route to the Black Sea for the Siberian agricultural products.

# Railway Officers.

### Executive, Financial and Legal Officers.

Wilbur C. Fisk, vice-president and general manager of the Hudson & Manhattan, with office at New York, has been elected president to succeed William G. McAdoo, resigned. Mr. McAdoo also resigned as director.

Henry William MacKenzie, whose election as comptroller of the Seaboard Air Line, with office at Portsmouth, Va., has been announced in these columns was born on December 30, 1876, in Hampton county, S. C., and was educated in the common schools. He began railway work on May 1, 1891 with the Florida Central & Peninsular, and was a clerk in various accounting branches of that road until it was taken over by the Seaboard Air Line in July, 1900. He was then bookkeeper for the comptroller of the Seaboard Air Line until February, 1902, and then was general bookkeeper. In March, 1906, he was made assistant to comptroller of the same road, which position he held at the time of his recent election as comptroller.

Samuel C. Stickney, who has been appointed assistant to the president of the Erie, with headquarters at New York, as has been announced in these columns, was educated at the Massachusetts Institute of Technology. He began railway service in Minnesota, as a rodman on location and construction. He was then for one year—1886—locating engineer in Iowa on the Chicago, St. Paul & Kansas City, now the Chicago Great Western. In 1887 he was appointed superintendent of construction in Illinois, and from 1888 to 1890 was engineer of maintenance of way of the same road. He went to the Chicago Union Transfer Railway in 1890, as chief engineer. From 1892 to 1894, he was assistant to president of the Chicago Great Western, and from 1894 to 1909, was vice-president and general manager of the same road. He entered the service of the Erie in 1909, and now becomes assistant to president of that road as above noted.

### Operating Officers.

William Lamb, trainmaster of the Illinois Central at Clinton, Ill., has been transferred to Waterloo, Ia., as trainmaster of the Waterloo terminals and Albert Lea district, succeeding John H. Rightmeyer.

G. A. Law, trainmaster of the Chicago, Burlington & Quincy at Aurora, Ill., has been appointed assistant superintendent of the Hannibal division, with headquarters at St. Louis, Mo., to succeed F. Cone, transferred.

Max Fiedler, general foreman of the Globe, Ariz., shops of the Arizona Eastern, has been appointed an assistant superintendent, Globe division, with office at Globe, succeeding D. Reid, transferred to the Phoenix division.

F. Ringer, engineer of maintenance of way of the Missouri, Kansas & Texas at Parsons, Kan., has been appointed superintendent of the McAlester district, with headquarters at McAlester, Okla., to succeed J. F. Hickey, resigned to accept other service.

E. L. Martin, J. F. Sanders and H. G. Harden, assistant superintendents of the Louisiana lines of the Southern Pacific, with headquarters at Lafayette, La., have resigned. George B. Herrington succeeds Mr. Martin, and W. S. Middlemas takes the place of Mr. Harden.

W. J. Stoneburner has been appointed general superintendent of the Alabama, Tennessee & Northern and the Tombigbee Valley, with office at York, Ala., in charge of the operating, the maintenance of way and the mechanical departments. He has served in various capacities on different lines, including the positions of superintendent of the Quincy, Omaha & Kansas City, 11 years; superintendent of the Missouri, Kansas & Texas, Northern Texas division; vice-president and general manager of the Texas City, Terminal & Transfer Company, and in the industrial department of the Missouri, Oklahoma & Gulf.

F. H. Hammill, who recently was appointed assistant general superintendent of the Chicago & North Western, with headquarters at Boone, Ia., was born January 23, 1872, at Rockford, Ill. He was educated in the public schools at Rockford, and began railway work as a telegraph operator for the Chicago & North Western. He was subsequently for fifteen years with the

Chicago, Milwaukee & St. Paul as telegraph operator and freight brakeman, ten years as train despatcher, and two years as chief despatcher. Mr. Hammill returned to the North Western in March, 1902, as trainmaster, later was assistant superintendent, and for seven years was superintendent. He was made superintendent of the Sioux City division on January 23, 1906, one year later was transferred to the Northern Wisconsin division in a similar capacity, and the past five years was superintendent of the Iowa division, from which position he was recently promoted to assistant general superintendent, as above noted.

### Traffic Officers.

W. H. L. Nelms has been appointed commercial agent of the Georgia & Florida, with office at Atlanta, Ga.

F. C. Moore, general eastern freight agent of the Chicago & Alton, has been appointed general eastern agent, with headquarters at New York City.

Edward Dowdle has been appointed traveling freight agent of the Union Pacific system, with office at St. Louis, Mo., to succeed J. F. Jutz, transferred.

L. Moore has been appointed traveling immigration agent of the Northern Pacific, with headquarters at Kansas City, Mo., to succeed H. B. Bryning, resigned.

C. R. Alvarez has been appointed commercial agent of the Georgia, Florida & Alabama, with office at Jacksonville, Fla., succeeding R. H. Dozier, resigned.

Tom O'Connell, contracting agent of the Wabash, has been appointed traveling freight agent, with office at Detroit, Mich., succeeding S. C. Lockman, promoted.

L. F. McFarland, formerly district passenger agent of the Chicago Great Western at Kansas City, Mo., has been appointed traveling passenger agent of the Southern Pacific, with office at Kansas City.

H. F. DeTurk has been appointed traveling freight agent of the Lake Erie & Western, with headquarters at San Francisco, Cal., and Arthur Corr has been made traveling freight agent, with office at New York City.

A. B. Chown has been appointed traveling passenger agent of the Grand Trunk, with office at Pittsburgh, Pa., succeeding C. E. Jenney, transferred, and the office of D. P. Drewery, traveling passenger agent at Cortland, N. Y., has been transferred to Buffalo.

The following have been appointed traveling freight agents of the Lake Erie & Western: F. C. Sheahan, Davenport, Ia.; E. J. Lewis, Minneapolis, Minn.; J. A. Sands, Kansas City, Mo., and N. D. Hoke, Philadelphia, Pa., and the position of soliciting freight agent formerly held by Mr. Lewis is abolished.

S. W. Bradford has been appointed commercial freight agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern at Monroe, La., in place of C. G. Johnson, who has been transferred to Jefferson City, Mo., as commercial agent, succeeding F. M. Curry, resigned to engage in other business.

Claude M. Harwood, traveling passenger agent of the Grand Trunk, with headquarters at Detroit, Mich., has been appointed city passenger and ticket agent at that place, succeeding George W. Watson, who has been transferred to Bay City, Mich., as passenger agent in place of F. C. Wherrett, who succeeds Mr. Harwood.

H. C. Strohm, who has been connected with the general passenger department of the Baltimore & Ohio at Chicago for several years, has been appointed traveling passenger agent of that company, with headquarters at Omaha, Neb., succeeding Edward Emery, formerly the traveling representative in that territory, promoted to general traveling agent, with headquarters at Baltimore, Md.

### Engineering and Rolling Stock Officers.

W. G. Reid has been appointed general foreman of the Globe, Ariz., shops of the Arizona Eastern, succeeding Max Fiedler, promoted.

H. W. Fenno, resident engineer of the Lake Shore & Michigan Southern at Erie, Pa., has been transferred to Chicago as resident engineer.

J. C. Hill has been appointed roadmaster of the Louisiana lines of the Southern Pacific, with office at Morgan City, La., in place of J. W. Moore, resigned.

N. C. Bettenberg, locomotive foreman of the Great Northern at St. Paul, Minn., has been appointed master mechanic, with headquarters at Crookston, Minn., in place of J. W. Smith, transferred to Duluth, Minn.

Abram Lucas, general foreman, locomotive department of the Chicago, Milwaukee & St. Paul at Milwaukee, Wis., has resigned to go to the Jacobs-Shupert U. S. Firebox Company, Coatesville, Pa., with office at Chicago.

William Welland has been appointed roadmaster of the Cotter district of the St. Louis, Iron Mountain & Southern, with headquarters at Batesville, Ark., in place of R. Cantrell, transferred to Aurora, Mo., as roadmaster of the Carthage district.

G. W. Seidel, superintendent of shops of the Chicago, Rock Island & Pacific at Silvis, Ill., has been appointed superintendent of motive power of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., to succeed C. E. Gossett, deceased, whose title was general master mechanic.

Victor King Hendricks, whose appointment as assistant chief engineer of the St. Louis & San Francisco, with headquarters at Springfield, Mo., has already been announced, was born May 28, 1869. He was graduated from the Rose Polytechnic Institute in June, 1889, and began railway work the following year as rodman for the Fairhaven & Southern, with which road he remained until January, 1892, as draftsman and transitman on construction. He was then for a year assistant engineer in charge of construction of the Bellingham Bay & Eastern, and from March to October, 1893, was a draftsman at the Indiana & Lafayette Bridge Works, when he returned to railway work as assistant engineer for the Terre Haute & Indianapolis. In January, 1894, he was made engineer maintenance of way of the Logansport division of that road, and in December, 1898, was promoted to engineer maintenance of way of the Terre Haute & Logansport, which was formerly known as the Logansport division of the Terre Haute & Indianapolis. Mr. Hendricks went to the Baltimore & Ohio in June, 1902, as assistant to engineer maintenance of way, and three years later was made division engineer at Baltimore, resigning January, 1907, to become assistant engineer maintenance of way of the St. Louis & San Francisco lines. From February, 1910, to October, 1911, he was office engineer of those lines, and then he was advanced to principal assistant engineer in charge of timber preservation of the St. Louis & San Francisco and the Chicago & Eastern Illinois. He now becomes assistant chief engineer of the St. Louis & San Francisco, as above noted.

V. K. Hendricks.

L. I. Stone has been appointed assistant engineer of the London division of the Grand Trunk, with headquarters at London, Ont. H. A. Palmer has been appointed assistant engineer of the Toronto Terminal, and James Boyd has been appointed assistant engineer of the Hamilton division with headquarters at Hamilton.

R. Q. Prendergast, whose appointment as master mechanic of the Indianapolis division of the Cincinnati, Hamilton & Dayton, with headquarters at Indianapolis, Ind., has already been announced, began railway work as a machinist apprentice with the

Baltimore & Ohio at Benwood, W. Va. After completing his apprenticeship he was made foreman at Cameron, W. Va., and subsequently was transferred to several of the large shops on the Baltimore & Ohio system, including the position of erecting shop foreman of the Mt. Clare shops. He left the Baltimore & Ohio to go to the Cumberland Valley at Chambersburg, Pa., and later became general foreman of the Delaware & Hudson at Carbondale, Pa. He resigned about five years ago to accept the position of master mechanic of the Denver & Rio Grande at Pueblo, Colo., which he held until his recent appointment as master mechanic, as noted above.

Frank Gilbert Jonah, who, on March 1, was made chief engineer of the St. Louis & San Francisco, with office at St. Louis, Mo., was born October 6, 1864, in Albert County, New Brunswick. He was educated in the high school at Moncton, N. B., and under private tuition. In May, 1882, he began railway work as a student in the chief engineer's office of the Intercolonial Railway, remaining there five years, during which time he acted in all capacities in field surveys of branch lines. The following two years he was assistant engineer in charge of government lines in Nova Scotia, and from 1889 to April, 1890, was assistant engineer of the Intercolonial Railway. On the latter date he became assistant engineer of the St. Louis Merchants' Bridge Terminal Railway, and four years later was appointed resident engineer of the St. Louis, Peoria & Northern. In December, 1899, he was made engineer maintenance of way of the Chicago & Alton, and from May, 1901, to March, 1903, he was chief engineer of the Blackwell, Enid & Southwestern. He was then for three months assistant engineer for the New Orleans Terminal Company, when he was appointed chief engineer of the St. Louis, Brownsville & Mexico, remaining in that position until October, 1904, when he was made locating engineer of the St. Louis & San Francisco. He returned to the New Orleans Terminal Company as terminal engineer in May, 1905, and on January 1, 1910, he accepted the office of engineer of construction of the St. Louis & San Francisco. He now as chief engineer assumes also the duties of chief engineer of operation.

### Purchasing Officers.

E. B. Dailey, assistant mechanical engineer of the Union Pacific at Omaha, Neb., and H. B. Henry, who has been in the office of the director of maintenance and operation of the Harriman Lines at New York, have been appointed assistants to the director of purchases of the Southern Pacific Company, both with offices at New York.

### Special Officers.

Marcus A. Dow has been appointed general safety agent of the New York Central Lines, with headquarters at New York, succeeding George Bradshaw, resigned, effective March 16.

## OBITUARY.

C. I. Kerr, trainmaster of the Chicago, Rock Island & Pacific, with headquarters at Herington, Kan., died suddenly on March 5, at Topeka, Kan.

Arthur W. Moss, superintendent of the Schuylkill division of the Pennsylvania Railroad, died on March 12, at Reading, Pa. He was born in Philadelphia, on May 4, 1859, and began railway work as an apprentice in the Altoona shops of the Pennsylvania.

John W. Crissey, assistant engineer of construction of the Lake Shore & Michigan Southern, with headquarters at Cleveland, Ohio, died on March 7, at Chicago, of pneumonia. Until a month ago Mr. Crissey had been resident engineer of the Lake Shore at Chicago, when he went to Cleveland to take charge of track elevation work.

William E. Rogers, for nine years a member of the New York state railroad commission, and for five years its chairman, having been appointed by Governor Grover Cleveland (1884), died at his home in New York City, March 11, at the age of 68. He served in the army in the civil war and in the engineering corps afterward, and after 1872 was engaged in railroad construction. Mr. Rogers' later activities have been in the legal profession.

# Equipment and Supplies.

## LOCOMOTIVE BUILDING.

THE INTERNATIONAL & GREAT NORTHERN is making inquiries for 10 locomotives.

THE MISSOURI PACIFIC has ordered 5 mikado locomotives from the Baldwin Locomotive Works.

THE CHICAGO, PEORIA & ST. LOUIS has ordered 10 consolidation locomotives from the American Locomotive Company.

THE MIDLAND PENNSYLVANIA has ordered 1 eight-wheel passenger locomotive from the Baldwin Locomotive Works.

THE SEABOARD AIR LINE is in the market for 25 Pacific type freight locomotives, 7 Pacific type passenger locomotives, 5 six-wheel locomotives and 1 dummy locomotive.

THE BUFFALO, ROCHESTER & PITTSBURGH is said to have ordered 12 mikado locomotives, and three switching type locomotives from the American Locomotive Company. This item has not been confirmed.

THE CITIZENS' GAS COMPANY, Indianapolis, Ind., has ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 24 in.; the diameter of the driving wheels will be 44 in., and the total weight in working order will be 133,000 lbs.

THE CHICAGO, TERRE HAUTE & SOUTHEASTERN, mentioned in the *Railway Age Gazette* of February 14 as being in the market for 5 locomotives, has ordered 5 consolidation locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters, will have 25 in. x 32 in. cylinders, and in working order will weigh 244,000 lbs.

THE CHICAGO & WESTERN INDIANA, mentioned in the *Railway Age Gazette* of March 7, as being in the market for 5 switching locomotives, has ordered 5 eight-wheel switching locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters, will have 24 in. x 30 in. cylinders, 57 in. driving wheels, and in working order will weigh 212,000 lbs.

## CAR BUILDING.

THE GEORGIA RAILROAD is in the market for 8 or 10 passenger cars.

THE INTERNATIONAL & GREAT NORTHERN is making inquiries for 1,000 freight cars.

THE ATLANTIC COAST LINE is in the market for 4 passenger and baggage cars, 12 coaches, and 4 mail and express cars.

THE SEABOARD AIR LINE, mentioned in the *Railway Age Gazette* of March 7, as being in the market for 1,500 freight cars, is now in the market for 1,800 freight cars. This inquiry comprises 1,000 steel underframe, 30-ton box cars, 300 all-steel 50-ton phosphate cars, 250 all-steel 50-ton hopper cars, and 250 steel underframe 40-ton flat cars.

THE PENNSYLVANIA RAILROAD, mentioned in the *Railway Age Gazette* of March 7, as being in the market for 307 passenger cars, has ordered 105 steel, suburban coaches from the Pressed Steel Car Company; 45 coaches, 25 express refrigerator cars, 25 baggage cars and 5 horse cars from the American Car & Foundry Company; and 72 steel, through coaches and 20 steel, combination passenger and baggage cars from the Standard Steel Car Company.

## IRON AND STEEL.

THE BOSTON & MAINE has ordered 1,000 tons of structural material from the Pennsylvania Steel Company.

## SIGNALING.

The Philadelphia & Reading has let to the Union Switch & Signal Company a contract for an interlocking plant at Palo Alto, Pa.; total cost of the work about $37,000.

# Supply Trade News.

J. H. Tweedy, Jr., has been elected a director of the Bucyrus Company.

John G. Johnson has been made a director of the Baldwin Locomotive Works, Philadelphia, Pa., succeeding E. C. Converse, resigned.

The H. W. Johns-Manville Company has purchased about 110 acres of land in the Calumet district near Chicago, adjacent to the Illinois Central, as a site for a large new plant.

Abram Lucas, general foreman of the locomotive department of the Chicago, Milwaukee & St. Paul, with office at Milwaukee, Wis., has resigned to go to the Jacobs-Shupert U. S. Fire Box Company, Coatesville, Pa., with office at Chicago.

The Raymond Concrete Pile Company, New York, has received a contract for placing 2,047 standard Raymond concrete piles for the foundation of the new grain elevator of the Chicago, Rock Island & Pacific at Kansas City, Mo.

The Isthmian Canal Commission will receive bids until March 26, on miscellaneous supplies, including electric traveling cranes, rails, angle bars, track bolts, switches, frogs, tie plates, track chisels, babbitt metal, etc. (Circular No. 764.)

The Street locomotive stoker, made by the Locomotive Stoker Company, New York, has been specified on the 40 Mallet locomotives ordered by the Norfolk & Western, and also on the 60 mikado locomotives and 10 Mallet locomotives ordered by the Baltimore & Ohio.

Burton W. Mudge & Co., Chicago, have been made agents for the Industrial Works, Bay City, Mich. This office will handle the products of the Industrial Works, including wrecking, locomotive and freight station cranes, pile drivers, transfer tables and grab buckets.

Richard F. Hawkins, of Springfield, Mass., died at his home in that city March 5, at the age of 76. Mr. Hawkins was a well known bridge builder and the proprietor of the R. F. Hawkins Iron Works. His firm was the successor of Stone & Harris, and inherited the Howe truss bridge.

The Bethlehem Steel Company, South Bethlehem, Pa., has declared a dividend of 5 per cent. on its preferred stock. This is the first dividend declared by the company since February, 1907. The dividend is payable quarterly in 1913. The last previous annual dividend on the preferred stock was 6 per cent.

The Brier Hill Steel Company, Youngstown, Ohio, is offering $5,000,000 7 per cent. cumulative preferred stock, redeemable at 105 after 1923. This company is spending about $4,000,000 in the construction of an open-hearth plant, blooming and finishing mills, and other equipment, which will add greatly to the output.

The Meeker Grip Nut Company, 1170 Broadway, New York, has just been formed to make and sell Meeker grip nuts. The officers of the company are as follows: President, Fred J. Lancaster; vice-president, Walter Schulze; and secretary and treasurer, Samuel G. Meeker. George Owens has been made manager of the sales department.

Walter H. Lienesch, formerly consulting engineer for the Illinois Traction System, has gone to the International Interlocking Rail Joint Manufacturing Company, Chicago, to take charge of the engineering department; and Burton E. Reed, formerly with the Vandalia Railroad, has been made assistant to the general manager of the same company.

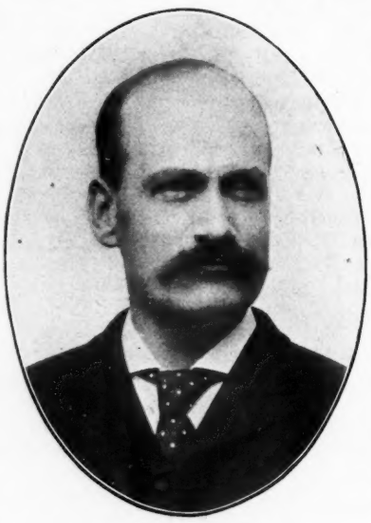
The Mead-Morrison Manufacturing Company, Boston, Mass., maker of coal handling machinery and steam and electric hoists, has purchased about 10 acres of land near the tracks of the Boston & Albany at East Boston, upon which it will immediately erect a large plant. This plant will consist of a plate shop, erecting shop, power plant, pattern shop, foundry and general offices. The shops will be equipped with four 10-ton cranes and one 25-ton crane. It will be completed in about four months.

The General Electric Company, Schenectady, N. Y., has received an order for the entire rolling stock apparatus equipment which will be required for the electrification of the Melbourne suburban system of the Victorian State Railways, Australia. This order comprises 400 motor car equipments, consisting of four motors each; 800 control equipments, 400 of which are for trailer cars, and 400 compressor equipments. This is believed to be the largest single order ever placed for electric railway apparatus.

The Smith Locomotive Adjustable Hub Plate Company, of Pittsburg, Kan., will equip some mountain type locomotives which are to be built for the Missouri Pacific with its adjustable hub plate and is now conducting a test on two heavy passenger locomotives operating in the Cascade mountain territory of the Great Northern. The company's hub plate has also been installed on 15 consolidation locomotives for the Kansas City Southern now being delivered, and on 40 Mikados just being completed for the Missouri, Kansas & Texas at the Schenectady plant of the American Locomotive Company.

### George M. Basford.

George M. Basford, assistant to the president of the American Locomotive Company, has resigned to accept a position as chief engineer of the railroad department of Joseph T. Ryerson & Son, Chicago. His headquarters will be at the New York office, 30 Church street, and the appointment will be effective March 15. Mr. Basford was graduated from the Massachusetts Institute of Technology in 1889. Directly afterwards he entered the Charlestown shops of the Boston & Maine, later going to the Chicago, Burlington & Quincy as a draftsman at Aurora, Ill. From there he went to Omaha, Neb., to take a position in the motive power department of the Union Pacific, and was also for some time connected with the test department of that road. Leaving the motive power department service he became signal engineer of the Chicago, Milwaukee & St. Paul, after which he was superintendent of construction of the Johnson Railway Signal Company, was for a short time with the Union Switch & Signal Company, and was signal engineer of the Hall Signal Company. In 1895 he left signal work to become mechanical department editor of the *Railway & Engineering Review*, and in 1897 was made editor of the *American Engineer & Railroad Journal*. In September, 1905, he accepted a position with the American Locomotive Company as assistant to the president, which position he now leaves to enter the service of the Ryerson company.



George M. Basford.

Mr. Basford is the father of the Railway Signal Association. Shortly after taking up editorial work in Chicago he called together a number of those interested in signaling, to consider the formation of a Railway Signaling Club, which later developed into the national association. For the first two years, 1895 and 1896, he was secretary-treasurer of the organization and a most active factor in its upbuilding.

Few men associated with the railway interests can number so many friends—real friends—as can Mr. Basford. And this he richly deserves, for he has been untiring in aiding others, either with advice or by helping them to better their condition. He has an unerring engineering instinct, which enables him to discard those things which are superficial and quickly get at the heart of a problem. It was this instinct, coupled with an extensive experience, and with his splendid character which made him such a power as an editor—for many years the *American Engineer* was informally designated as "Basford's paper," and still is by some, although it is seven and a half years since he left it. And when we recall that for a considerable part of his eight or nine years' work on that paper he had no editorial assistant, no stenographer, and that the

office was not equipped with a telephone, we marvel at the powerful influence he was able to exert through its pages in securing a more fitting recognition of the real importance of the motive power department in the railway organization.

In the fall of 1903 Mr. Basford was in receipt of a signal honor, the like of which has never been conferred upon a man in the railway or railway supply field before or since. In a quiet way fifty-eight of the railway and railway supply men who were known to be close personal friends of Mr. Basford's joined together and presented him with a volume of personal letters expressing their appreciation of him, and accompanied by a substantial check to defray the expenses of a trip abroad. The following is taken from an informal presentation address made by W. S. Morris, who was then with the Erie Railroad: "The gentlemen around you are not only your personal friends, but they are here to represent a host of admirers, whom you can with pride claim also as friends. We are here to tender not only our admiration of the efforts God has infused within your character and ambition, but to thank you in behalf of the many who have been instructed and benefited by your industry and faithfulness to the science through which we all claim kin to one another. In all probabilities this is the first time in the history of this generation, at least, that one has been so honored by the mechanical fraternity of this country, and we assure you it is extended with every thought of true manliness and absolute worthiness on the part of him to whom these words are addressed. To be plain, Mr. Basford, your friends feel that you have well earned some token of recognition at their hands, and we beg that you will accept this volume, which contains the sentiment, individually, of those whom the gentlemen here present have the honor to represent, and this, which is intended to give you a much needed rest in the way of an extended trip to Europe; and, also, although perhaps selfishly, we hope you may find some time to tell us of your travels and give some hints of interest which may be found on the other side."

Mr. Basford is widely known because of the impetus he gave to the development of the movement for educating and training apprentices and workmen, for he had a keen realization of the fact that the most vital problem confronting the railways is that of *men*. In 1905, after he had given several years of careful study to the situation he presented a paper before the Railway Master Mechanics' Association on "The Technical Education of Railroad Employees—The Men of the Future." The principles which he outlined in this paper attracted wide attention, not only in the railroad field but in the industrial world as well, and were taken as the foundation of such modern apprenticeship systems as those on the New York Central Lines and the Atchison, Topeka & Santa Fe. And it may be said at this date, almost eight years after the presentation of the paper, that apprenticeship systems on the railways have proved successful in so far as they have followed the fundamental principles laid down in Mr. Basford's paper. The preparation of this paper might well be studied by young men who are ambitious to make their efforts felt in the railway field, and it affords a marked contrast to some of the papers and reports which are often presented before railway clubs and technical associations. It was the result of years of study of conditions on the railroads in this country and a practical experience in mechanical department work. Foreign methods had been carefully looked over on his trip abroad and then the whole scheme was carefully planned and outlined. The paper was then drafted roughly and was rewritten and rewritten until every sentence was carefully rounded out and every superfluous word removed, so that the thought was clear and forceful throughout. It was then submitted for criticism to a number of leading railway officers and industrial managers, and their comments were carefully considered in its revision, although it may truthfully be said that such revision as was made was very slight indeed. And dominating it all was a broad spirit of fellowship for his fellow man, which is so characteristic of Mr. Basford. It is little wonder that it marked the real corner-stone of railway apprenticeship education in this country, and it is to be regretted that more railroads have not adopted and lived up to its spirit.

It would be hard to comment intelligently upon Mr. Basford's work as assistant to the president of the American Locomotive Company, for necessarily a large part of it was in special assignments and would be very little known outside of the officers of the company. Of one definite duty, however, which was assigned to him during the entire time of his association with that company we may speak authoritatively, and that is the matter of publicity. Many years ago when an editor Mr. Basford said that the day would come when the advertising pages of the railway technical papers would be read first, for the advertiser when he awakened to the real possibilities of advertising would have a distinct advantage over the editors, because he could display his data to so much better advantage, not being tied down to the standards of typography that the editor must observe; and to Mr. Basford belongs the honor of being the first to consistently make such use of the advertising pages as to secure the close attention of railway officers and indeed to make many of them tear out and preserve the ads. of his company, so valuable was the information presented therein. Most of our readers are familiar with this work. The campaign was carefully planned and developed, just as the editor of a paper would plan and develop his editorial policy, and was based upon supplying to the railways information which they greatly needed, and presented in such a way as to make railway men read it and feel its forcefulness. This feature, which was quickly observed by other companies, is being adopted by many of them and has brought about a new era of publicity in the railway field.

During the winter of 1908-9 while the Railway Business Association was in its early stages of development an arrangement was made with the American Locomotive Company whereby Mr. Basford gave part of his time to the work of that association. That his efforts were fruitful is indicated by the following paragraph in a letter written by George A. Post, president of the association (a copy of which Mr. Post has kindly furnished us) when it became necessary for Mr. Basford to withdraw from active personal participation in the work, because of the pressing demands of his duties with the American Locomotive Company: "Whatever may be the ultimate verdict as to the usefulness and necessity for this association, there can be but one judgment of what you did in an emergent situation, when you brought to it the vigor of your push and industry, the good cheer of your persuasive personality and the impetus of your alert and fecund mentality. To work with you has been an unalloyed pleasure; to confer with you has been to draw inspiration, and to part with your services is a distinct loss which I shall constantly deplore. If, in carrying the burdens devolving upon me in this work, no other dividend of the like were mine than that afforded by the opportunity to feel that I am heart-hitched to George Basford thereby, I shall always feel that the Railway Business Association did a splendid thing for me."

Mr. Basford's hobby has always been the locomotive, and his efforts in its development were recently summed up by one of his friends as follows: "He has persistently striven to impress upon every one connected with the work, both through his paper and through his personal contact, with a possibility of improving locomotive practice by rational and progressive engineering methods, and is largely responsible for the improvement that has taken place not only in the general design of the locomotive, but also in the improvement in the construction of its various parts which has so largely increased its efficiency and economy in operation. The care which Mr. Basford took in carrying out the experiments on locomotive front ends and nozzles, which led to the completion of these experiments by the Master Mechanics' Association, is only one example of his endeavors to place the design of the locomotive on a thoroughly sound foundation. The success of these experiments was no doubt a strong factor in the adoption of the locomotive testing plant, and the knowledge we now possess as to what engines are actually doing, and what results can be obtained from them. Not only in locomotive design, but in shop practice and road work generally, Mr. Basford has energetically encouraged his friends and acquaintances, including all the important mechanical men in the country, to continually improve their results. I do not think you will make any mistake in crediting him with a large share of the development in the last fifteen years."

Possibly this sketch might well be closed with the following brief summation of his personality by another one of his friends: "He has a clear conception of mechanical and oper-

ating needs. A way of keeping himself in the background and furnishing his numerous friends with good ideas from his generous store. Taking great pleasure in the advancement of young men and helpful to all with whom he comes in contact."

## TRADE PUBLICATIONS.

Machine Tools.—The Betts Machine Company, Wilmington, Del., has published a small illustrated folder on its extra heavy, double-drive, 8 ft., boring and turning mill.

Spark Arresters.—Burton W. Mudge Company, Chicago, have issued an illustrated folder describing the construction and advantages of the Mudge-Slater spark arrester.

Railway Material Inspection.—Morgan T. Jones, Chicago, has published an interesting booklet entitled "Railway Material Inspection." Copies may be obtained on application.

Wabash.—The passenger department has issued an attractive illustrated folder entitled "Steel," describing the new all-steel passenger equipment which has been placed in service recently between Chicago and St. Louis, St. Louis and Kansas City, and Detroit and St. Louis.

Air Compressers.—The Ingersoll Rand Company, New York, has devoted form No. 575 to its class P. E., direct connected, electric-driven, air compressers. This booklet in addition to illustrations and descriptions furnishes instructions for installing and operating these compressers, and also includes a duplicate part list.

Ball Bearings in Machine Tools.—The Hess-Bright Manufacturing Company, Philadelphia, Pa., has published a handsome booklet on ball bearings in machine tools. The booklet says that the function of the Hess-Bright ball bearings is to save repairs and to maintain original accuracy and alinement of spindles, etc., quite as much as it is to save power.

Electrical Equipment for Buildings.—The Sprague Electric Works of General Electric Company, New York, has published in bulletin No. 115, illustrations and descriptions of its electrical equipment for buildings. Several installations are illustrated, including the air compressor equipment of the Chicago & North Western passenger station at Chicago.

Culverts.—The Canton Culvert Company, Canton, Ohio, has devoted a very attractive booklet to its Acme Nestable corrugated metal culverts and other products. These culverts are illustrated and described in detail. A table giving the diameters of gages, thicknesses, weights and carrying capacities is included. The booklet also illustrates a number of strength tests to which these culverts have been submitted.

New York Central Lines.—The passenger department of this company has issued an unusually attractive folder on the Grand Central Terminal, New York. This bulletin contains many colored views of the terminal and illustrates also some of the chief points of interest in the city. One group of illustrations shows the various steps in the evolution of the Grand Central Terminal. The folder also gives an account of the evolution of the terminal and a description of its present advantages. A map of the city and a condensed guide to the chief points of interest are also included.

National Railway Appliances Association.—The publication committee of this association has issued a Year Book for 1913, containing a comprehensive list of exhibitors at the annual exhibit to be held at the Coliseum and the First Regiment Armory in Chicago next week, in connection with the convention of the American Railway Engineering Association, and pointing out the value of the exhibition to railway men from an educational standpoint. Eight thousand copies of the book have been mailed to railway men, together with an invitation and tickets to attend the exhibit. The frontispiece is a large photograph of the interior of the Coliseum during the 1912 exhibit. This is followed by a list of the officers and directors of the association from 1894 up to date, an article devoted to the history and policies of the association, illustrated by photographs of different features of the exhibits at the Coliseum during recent years, and a list of the exhibitors for the 1913 exhibit.

# Railway Construction.

Asherton & Gulf.—This company has applied to the Railroad Commission of Texas for authority to issue $550,000 of bonds on 32 miles of its completed line. It is announced that as soon as these bonds are issued work on the extension west from Asherton to Del Rio via Eagle Pass, about 100 miles, will be started. (October 18, p. 774.)

Atchison, Topeka & Santa Fe.—The Dodge City & Cimarron Valley has been opened for business from Dodge City, Kan., southwest to Hugoton. (September 22, p. 599.)

An officer writes regarding the report that a branch line is to be built through the San Luis Rey valley, Cal., that the company will build a 4-mile line from Oceanside up the valley to reach a section devoted to the cultivation of sugar beets, and the line will not be further extended.

Beaumont & Great Northern.—See Missouri, Kansas & Texas.

Billings & Central.—According to press reports from Billings, Mont., the Billings Land & Irrigation Company has made financial arrangements to build under the name of the Billings & Central a 20-mile line to Crooked creek. Surveys are now being made, and it is understood that the construction work will be started at once. The line is eventually to be extended north to a connection with the Chicago, Milwaukee & St. Paul at Roundup.

Burrard Westminster Boundary Railway & Navigation Company.—This company is applying to the Canadian parliament for an extension of time to build lines as follows: From the north side of False creek, Vancouver, B. C., crossing False creek by a bridge southeasterly through Vancouver, Hastings, South Vancouver, Burnaby and New Westminster to the Fraser river bridge, thence northeasterly through New Westminster and Coquitlam to Port Moody, and westerly to the proposed location of the Vancouver, Westminster & Yukon railway bridge at the second narrows of Burrard Inlet, thence westerly through Hastings back to Vancouver; from the south end of the proposed Vancouver, Westminster & Yukon bridge, northerly, crossing the bridge along Seymour creek to the northerly boundary of North Vancouver, thence easterly to the north arm of Burrard Inlet, and from North Vancouver westerly to Howe Sound; from the north end of the Fraser river bridge at New Westminster, crossing the bridge and thence southerly to the international boundary between Semiamu bay and Sumas; from the south side of False creek, through Vancouver and South Vancouver to Point Grey, returning in a southeasterly direction to the starting point; from Port Moody easterly to Dewdney trunk road through Coquitlam, Maple Ridge and Mission to the Stave river, and from the Fraser river bridge line in an easterly and northerly direction through Yale, Lillooet and Cariboo to Tete Jaune, joining the proposed Vancouver, Westminster & Yukon branch to Edmonton, Alta. A. G. Kitto, Vancouver, B. C., is solicitor for applicants.

Butte, Anaconda & Pacific.—A new branch called the Southern Cross Line has been opened for business, from Anaconda, Mont., to Southern Cross.

Canadian Northern.—Construction work has been commenced on the Lulu Island branch, at mile 6 below New Westminster, B. C., and about a mile farther west, there will be a trestle two miles long, crossing a muskeg. It is anticipated that this line will be completed about the end of May. The Northern Construction Company are the general contractors. About 89 per cent. of the grading between Port Mann and Kamloops, B. C., has been completed, and about 39 per cent. between Kamloops and Albreda Summit on the divide between the Upper Fraser and North Thompson rivers. The tunnel work between New Westminster and Kamloops is about 93 per cent. completed. Up to the present time, about 15,250,000 cu. yds. of material have been handled on the main line between New Westminster and Kamloops. T. H. White, Vancouver, is chief engineer in British Columbia.

Canadian North Western.—The Canadian parliament is being asked to incorporate this company to build from a point in or near Lethbridge, Alta., northeasterly to a point at or near

Winnipeg, and from Winnipeg to a point at or near Pas, Man., passing near Dominion City, Manitou, Brandon and Grand View, and another line from Lethbridge, Alta., northeasterly through Alberta and Saskatchewan to Pas, Man., via North Battleford and Prince Albert, Sask., Brosseau, Tansey & Angers, Ottawa, are solicitors for applicants.

CENTRAL CANADA.—Incorporation has been asked for in Alberta to build from a point in township 74 or 75, range 18 or 19, west of the fifth principal meridian, to or near Peace River Landing, Alta., thence in a generally westerly direction to a point in township 81, range 4, west of the sixth principal meridian, and a branch line from a point near Peace River Landing northerly towards the Battle river, to a point in township 94, range 22, west of the fifth principal meridian. The capital stock of the company will be $500,000, and the headquarters will be at Edmonton, Alta.; the provisional directors include J. D. McArthur, Winnipeg, Man.; J. K. McLennan, A. C. Galbraith, S. B. Woods and J. T. J. Collisson, of Edmonton.

DALLAS, CLEBURNE & SOUTHWESTERN.—See Missouri, Kansas & Texas.

DENISON, BONHAM & NEW ORLEANS.—See Missouri, Kansas & Texas.

DODGE CITY & CIMARRON VALLEY.—See Atchison, Topeka & Santa Fe.

EDMONTON, STONY PLAIN & WABAMUN.—This company, with a capital of $750,000 and headquarters at Edmonton, Alta., has asked for incorporation in Alberta to build railway lines, from Edmonton to Stony Plain, and thence westerly to Lake Wabamun. The provisional directors include A. Boileau and E. S. McQuaid, of Edmonton, and A. V. Pujebet, Paris, France.

EL PASO & SOUTHWESTERN.—The Huachuca branch of the Western division has been opened for business from Lewis Springs, Ariz., west to Fort Huachuca, 13 miles. (November 29, p. 1063.)

GRAND RAPIDS & NORTHWESTERN.—An officer writes that this company was organized in Michigan and will have terminals in the cities of Milwaukee, Wis., and Manitowoc, on the west shore of Lake Michigan, also at Ludington, Mich., and at Grand Rapids. The company proposes to operate car ferries across the lake from Ludington, Mich., to Milwaukee and Manitowoc and build a railway from Ludington southeast to Grand Rapids, about 98 miles. Valuable terminal rights and privileges in the city of Milwaukee, including ferry slips, have been secured, and the company has exclusive terminals and water front property over a mile and a half long on Ludington Harbor upon which it intends to build all necessary terminal tracks and ferry slips. It is the intention to standardize the old Mason & Oceania Railroad grade, which the company now owns. Work will be started at once to realine and widen eleven miles of this old grade and resurface seven miles of new grade. Contracts are now being let to build the line. J. N. Tittemore, president, Walter S. Syrett, vice-president in charge of construction, and T. R. Philbin, chief engineer, Chicago.

HOUSTON & BRAZOS VALLEY.—This company has amended its charter to provide for an extension from Velasco, Tex., to Bryan Heights, on the west side of the Brazos river.

LOUISIANA SOUTHERN.—This road has been extended from Pointe-a-la-Hache, La., to Bohemia, 5 miles.

MASON & OCEANIA.—See Grand Rapids & Northwestern.

MERIDIAN & MEMPHIS.—An officer writes that track laying is now under way from Meridian, Miss., northwest to Union, about 32 miles. There will be 3 steel bridges on the line varying in length from 100 to 200 ft. each. J. T. Schley, president, Mobile, Ala.; L. W. Duffee, chief engineer, Meridian, Miss. (December 6, p. 1116.)

MIDLAND CONTINENTAL.—An officer is quoted as saying that work will be carried out this summer north of Jamestown, N. D., on a section of 150 miles. The road is now in operation from Edgeley north to Jamestown 50.1 miles, and the plans call for building north to Pembina, about 230 miles from Edgeley. (May 10, p. 1078.)

MISSOURI, KANSAS & TEXAS.—This company is planning to build extensions, it is said, to a number of lines that have been taken over by the M. K. & T., under the provisions of a bill that was recently passed by the legislature of Texas. The bill provides for an extension of the Texas Central northwest from Rotan, Tex., to a point in Parmer county on the Texas-New Mexico line, about 200 miles; the branch from De Leon to Cross Plains is to be extended west from the latter place to Sweetwater, 75 miles, and a branch built from Dublin, north to the coal fields of Palo Pinto county, 50 miles. An extension of the Wichita Falls & Southern is to be built from Newcastle south to Cisco, 60 miles. The Denison, Bonham & New Orleans is to be built from Bonham south to Wolfe City, 20 miles. The Dallas, Cleburne & Southwestern is to be built from Cleburne northeast to Dallas, 50 miles, and the Beaumont & Great Northern is authorized to build an extension from Weldon, northwest to Jewett, 50 miles. This extension is now under construction.

MISSOURI, OKLAHOMA & GULF.—This road has been extended from Wagoner, Okla., north to Joplin, Mo., 113.6 miles. (September 17, p. 491.)

MONTOUR RAILROAD.—An officer writes that this company is a consolidation of the Montour Railroad, the Pittsburgh & Moon Run Railroad, and the North Star & Mifflin Railroad. The line extends from Montour Junction on the Pittsburg & Lake Erie, near Coraopolis, Pa., to Mifflin yard, the terminus of the Thompsons Run branch of the Union Railroad. The road was built to connect the coal fields belonging to the Pittsburg Coal Company with the Pittsburg & Lake Erie, the Pittsburg, Cincinnati, Chicago & St. Louis, the Wabash, the Baltimore & Ohio, the West Side Belt and the Union Railroad. A contract has recently been given to John Marsch, Chicago, to build an extension of 35 miles from North Star to Mifflin yard. The company will do the track laying and the ballasting with its own forces. Contracts for all other work have been let, except for bridges and track material, which will be let in a short time. (February 28, p. 411.)

MOUNTAIN VALLEY & PLAINS.—According to press report financial arrangements have been made and construction work will be started in the near future. The company was chartered in 1909 to build from Cimarron, N. Mex., east through the Panhandle of Texas, to Guthrie, Okla., about 450 miles. The incorporators included E. C. Gray, Higgins, Tex.; D. W. Herrington, Dalhart; H. F. Wannamaker, Amistad, N. Mex., and C. L. Johnson, Arnett, Okla. J. H. Conlin, chief engineer, Dalhart, Tex.

NACOGDOCHES & SOUTHEASTERN.—An officer writes that the company has arranged to build an extension from the present terminus at Dunham, Tex., to a connection with the Angelina & Neches River, between 2½ and 3 miles. (February 21, p. 373.)

NEWTON, KANSAS & NEBRASKA.—According to press reports this company, which was organized last year, has made arrangements to build from Milton, Kan., north via Newton, and Abilene to Fairfield, Neb. T. H. McManus, president, Newton. C. M. Barnes, of Oklahoma, M. Cassidy, of Guthrie, and capitalists of Kansas City are back of the project. (November 15, p. 973.)

NIAGARA, WELLAND & LAKE ERIE (Electric).—An officer writes that the plans call for building from Welland, Ont., northeast to Niagara Falls, also from Welland south to Port Colborne, thence east following the north shore of Lake Erie to Fort Erie, opposite Buffalo, N. Y., in all about 31 miles. The company now operates about a mile and a half of track in the city of Welland and extensions will be made soon to outlying sections of the town, each one mile in length, also a line at Dainville, two miles. There will be one swing or bascule bridge to have a 50-ft. span, and a 300-ft. trestle, probably three transformer stations, and one car barn will be constructed. T. R. Cummins, Welland, is engineer.

NORFOLK, YORKTOWN & WASHINGTON.—According to press reports, plans are being made for a line on which work is to be started soon from a point in Gloucester county, Va., north to Fairfax, about 156 miles. P. T. Hoven, president, L. C. Steele, vice-president and treasurer.

OCILLA SOUTHERN.—An officer writes that at the present time the company cannot give any definite information regarding the

report that an extension is to be built from Nashville, Ga., east about 50 miles to Waycross. It has not yet been decided whether the extension will be built or not. (February 28, p. 411.)

Oklahoma Northern.—An officer of this company, which was recently incorporated to build from Vinita, Okla., northwest to Coffeyville, Kan., about 42 miles, writes that work will be started within the next 60 days and will be carried on by the company. More than nine miles of the grade has been finished out of Vinita northwest. Arrangements have been made for the use of the Missouri, Kansas & Texas terminals at both Vinita and at Coffeyville. A. King, vice-president and general manager, 574 Brandies building, Omaha, Neb. (March 7, p. 459.)

Pecos Valley Southern.—According to press report this company is planning to build an extension from the present southern terminus south to Alpine, Tex., about 50 miles. Also to build on the north from Pecos northeast towards Tehoka.

Southern Railway.—President Finley announces that the main line is to be double tracked between Armour and Cross Keys, Ga., this section having heretofore been operated as a single track gauntlet in the double track between Atlanta and Gainesville. The grades will be reduced and much of the curvature of the present line will be eliminated. Work is to be commenced as soon as practicable and pushed to completion.

Temiskaming & Northern Ontario.—A contract for the construction of a line from Iroquois Falls on the main line to Iroquois Falls on the Abitibi river, about seven miles, has been given to Macdougall & McCluskey, Cochrane, Ont. The work is to be completed by June 1. (November 29, p. 1064.)

Texas Central.—See Missouri, Kansas & Texas.

Texas Roads.—The Interstate Development Company has been organized in Arizona to promote the construction of a railroad between either Dallas, Tex., or Fort Worth and Port Arthur. This proposed new line, it is said, will traverse a territory that is rich in agricultural and timber resources. The general offices of the railroad company will be at Lufkin, Tex. The officers of the Interstate Development Company are Dr. R. B. Bledsoe, president; W. M. Glenn, vice-president; W. R. McMullen, treasurer, and Colonel P. A. McCarthy, secretary, all of Lufkin. Arrangements are being made for financing the proposed line. The promoting company will secure the right-of-way, make necessary surveys and raise bonuses along the route.

Wichita Falls & Southern.—See Missouri, Kansas & Texas.

Williamsport, Nessle & Martinsburg.—Incorporated in West Virginia with $250,000 capital and principal office at Martinsburg. The plans call for building from Williamsport, Md., southwest to Martinsburg, W. Va., about 15 miles.

## RAILWAY STRUCTURES.

Ashtabula, Ohio.—See an item in General News regarding the construction of new car shops for the Lake Shore & Michigan Southern at Ashtabula.

Bellville, Tex.—See item under Caldwell, Tex.

Caldwell, Tex.—The Gulf, Colorado & Santa Fe has let a contract to Street & Born, for the erection of passenger stations to cost over $20,000 each, at Caldwell, Cameron and Bellville, Tex., to be completed this year.

Cameron, Tex.—See item under Caldwell, Tex.

Prince Rupert, B. C.—The Grand Trunk Pacific has been authorized by the Railway Commissioners of Canada to build bridges as follows: Across Porphyry creek, Prince Rupert East, B. C.; across Eagle creek, Sask.; across Boulder creek, and across Trout creek, Prince Rupert East, B. C.; across Little Shuswap river, west of Winnipeg, Man.; across Telkwa river, Prince Rupert East, B. C., and across Fiddle creek, Wolf Creek West, B. C.

St. Paul, Minn.—The Chicago, Rock Island & Pacific will spend $500,000 this year, it is said, building new terminals, shops and roundhouses at St. Paul.

# Railway Financial News.

Atlantic Coast Line.—This company has sold to a syndicate of New York bankers $3,500,000 unified mortgage, 4 per cent. bonds of 1909-1959. White, Weld & Company, New York, are offering these bonds at 87, using about 4.70 per cent. on the investment. Including the bonds recently sold there are now $20,144,000 of a total authorized issue of $200,000,000. The bonds are secured by a mortgage on 4,221 miles of railroad and are a first lien on 274 miles of this railroad.

Atlantic, Northern & Southern.—The sale of this road, which took place on March 1, has been set aside and a re-sale has been ordered for March 21.

Boston & Maine.—White, Weld & Company, Harris, Forbes & Company, and Kissel, Kinnicutt & Company, all of New York, have bought $7,500,000 20-year debenture 4½ per cent. bonds. These bonds are a legal investment for savings banks in Massachusetts, Maine, New Hampshire and Connecticut.

Cambria & Clearfield.—Stockholders of the Pennsylvania Railroad, at the annual meeting on March 11, voted to ratify the action of the directors in taking over the Cambria & Clearfield.

Chicago, Burlington & Quincy.—This company has sold $5,000,000 general mortgage 4 per cent. bonds.

Grand Trunk.—Joseph Ramsey, Jr., has brought a suit against the Rail & River Coal Company for an amount in the neighborhood of $500,000, which he claims is due him as commission on the sale of coal land in Belmont county, Ohio, to the Grand Trunk Development Company. The purchase of this coal land, it is understood, was negotiated for by Charles M. Hays, but final contracts were not signed before Mr. Hays' death.

Kansas City, Mexico & Orient.—The Kansas City *Journal* says that a claim of $1,045,000 held by the American Car & Foundry against the Kansas City, Mexico & Orient has been settled by the payment by the receivers of $845,000. The payment is to be made partly in cash and partly in receivers' certificates.

Keokuk & Des Moines.—A dividend of 3½ per cent. has been declared on the preferred stock, payable April 1. In 1910, 1911 and 1912 each 2½ per cent. was paid.

Lake Shore & Michigan Southern.—J. P. Morgan & Co., New York, have bought $12,000,000 one-year 4½ per cent. notes of March 15.

Louisville & Nashville.—J. P. Morgan & Co., New York, have bought $4,000,000 Louisville & Nashville unified 4 per cent. bonds and $4,500,000 Atlanta, Knoxville & Cincinnati division 4 per cent. bonds.

Missouri, Kansas & Texas.—The directors have authorized the sale of $19,000,000 2-year 5 per cent. notes to Speyer & Co., New York. The M. K. & T. has $16,000,000 2-year notes maturing May 1, and $1,500,000 1-year notes maturing July 1. The sale of the new notes will provide for refunding of these two issues.

New York State Railways.—The New York Public Service Commission, Second district, has authorized this company, which is controlled by the New York Central & Hudson River, and which operates a system of street and interurban railways in New York state, to issue $2,748,000 first consolidated 50-year mortgage bonds at 91½. The proceeds of this sale are to be used to pay off notes and maturing bonds of this and subsidiary companies.

Pennsylvania Railroad.—See Cambria & Clearfield.

Union Pacific.—No action was taken at the conference held by directors of the Union Pacific on March 11, on the dissolution plan. One of the directors is quoted as saying: "I cannot say that the plan is definitely abandoned. The situation remains unchanged. There are no arrangements for any further Union Pacific meetings this week." The underwriting syndicate by which Southern Pacific stock was to be sold to Union and Southern Pacific stockholders at par expires on Saturday.